SERVICE MANUAL SD8000

marantz®

model SD8000

Stereo Cassette Deck

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Australia

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Hauts-de-Seine
France

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Staines
Middlesex
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D-6072 Dreieich 1
West Germany

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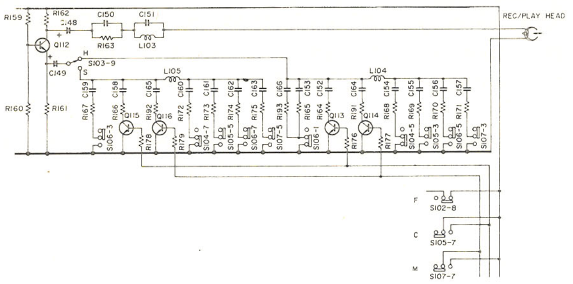
3.4 RECORDING COMPENSATING CIRCUIT

(Tape Speed: 3-3/4 ips)


R159
R162
C148
C150
C151
R163
L103
REC/PLAY HEAD
Q112
H
S103-9
S
C149
L105
L104
C159
C158
C165
C160
C161
C162
C163
C166
C153
C152
C164
C154
C155
C156
C157
R160
R161
R167
R166
Q115
R192
Q116
R172
R173
R174
R175
R193
R165
R164
Q113
R191
Q114
R168
R169
R170
R171
S106-3
R178
R179
S104-7
S105-5
S106-7
S107-5
S106-1
R176
R177
S104-5
S105-3
S106-5
S107-3
F
S102-8
C
S105-7
M
S107-7

S103	Tape Speed Switch
S105	Tape Selector Switch CrO_2
S107	Tape Selector Switch Metal

In the circuit diagram, C150 and R163 are used for high range compensation.

L104, R168, R169, R170, R171 and C154, C155, C156, C157 form a peeking circuit. Peeking frequency and the amount of compensation are selected by the tape selector switch.

R165, R193 and C153, C166 are used for medium range compensation. The amount of compensation is selected by the tape selector switch (not available at "Normal" position).

3.5 BIAS OSCILLATOR CIRCUIT/ERASE OSCILLATOR CIRCUIT

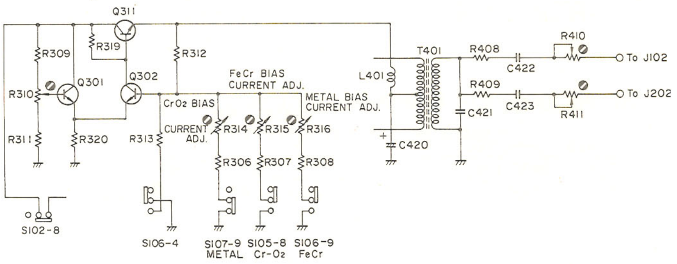
The SD8000 has a bias oscillator circuit and an erase oscillator circuit to provide optimum bias and erase current for the use of metal tapes.

- The bias oscilator circuit is driven by a regulated amplifier power supply.
- The erase oscillator circuit is driven by the motor power supply.

The bias current for any particular type of tape is selectable by the circuit shown below (selection of bias current is independent of tape speed).

1. Bias Oscillator Circuit

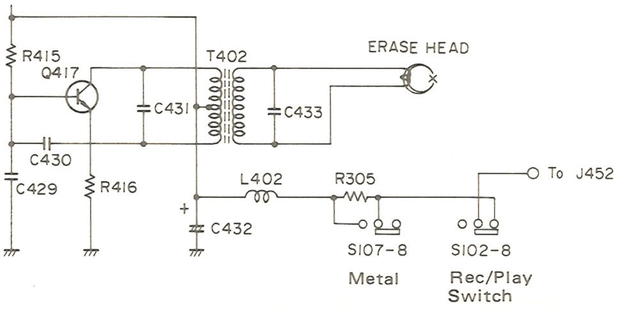
As shown bellow, by varying the Q302 base voltage, the bias oscillator circuit operational voltage is altered. In case of 4-3/4 i.p.s. (9.5 cm/sec), do not adjust by bias current. Adjust the recording EQ circuit, instead. Incidentally, R310 is the bias fine adjust control on the front panel.


Q311
R309
R319
R312
R310
Q301
Q302
FeCr BIAS CURRENT ADJ.
CrO2 BIAS CURRENT ADJ.
METAL BIAS CURRENT ADJ.
R311
R320
R313
R314
R315
R316
R306
R307
R308
L401
T401
R408
R410
C422
To J102
R409
C421
C423
R411
To J202
C420
S102-8
S106-4
S107-9 METAL
S105-8 Cr-O2
S106-9 FeCr

	Normal	CrO_2	FeCr	Metal
1-7/8 ips (4.75cm/s)	R411 R410	R315	R316	R314

2. Erase Oscillator Circuit

The erase oscillator circuit consists of Q417 and T402. Only in case of metal tapes, R305 is shorted to increase the erase current.


R415
Q417
T402
ERASE HEAD
C431
C433
C430
C429
R416
L402
R305
To J452
C432
S107-8
Metal
S102-8
Rec/Play Switch

3-6. CONTROL CIRCUIT OPERATION

1. General

The SD8000 tape deck is designed to have a wide variety of functions such as time setting, timer setting, programming, counter function and memory function; all these are accomplished by a single 1-chip, 4-bit microcomputer element µPD546C.

Although the microcomputer performs complex functions, the control circuit is extremely simple.

In the microcomputer, the memory and control functions are processed together at high speed through the levels and timing of digital pulses available at input and output terminals.

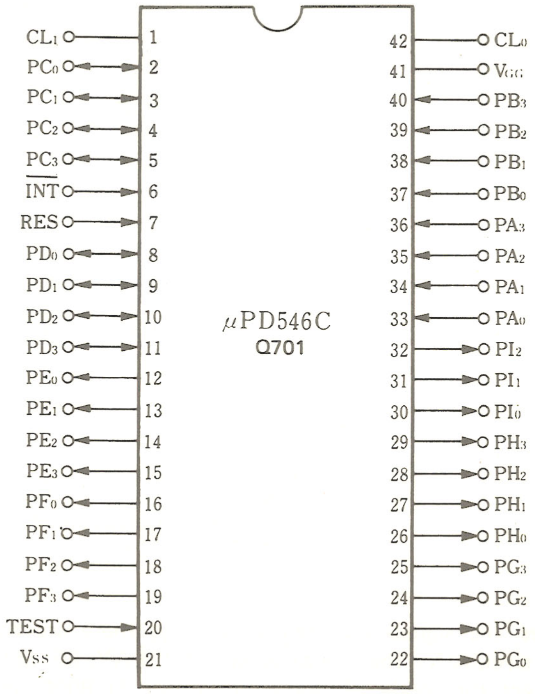
Since this instruction manual is limited in space, it is impossible to explain in detail the methods of measuring and checking the relationship between the input/output signals and their timing. Thus, this manual is intended only to cover the functions of operation buttons and matrix keys.

The SD8000 has various types of keys and switches to provide multiple operations, so special care should be taken when it is necessary to check the cause of trouble or misoperation.

This manual mainly deals with the functions of the SD8000 control circuit. Note that voltages and operating timing given in this manual are for reference purposes and are subject to change according to changes in power supply voltage and production tolerance of components.

2. Microcomputer

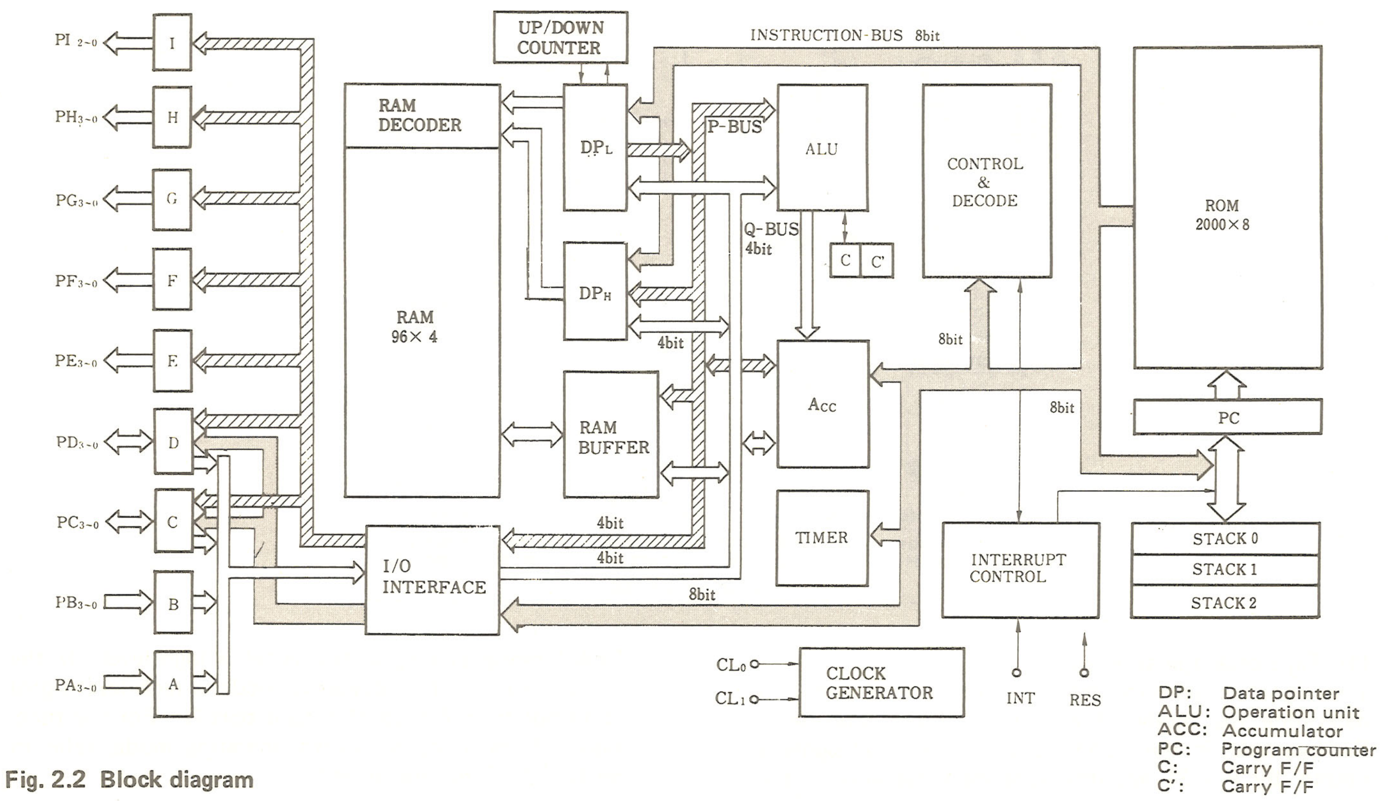
Terminal arrangement (front view)


CL1 1
PC0 2
PC1 3
PC2 4
PC3 5
INT 6
RES 7
PD0 8
PD1 9
PD2 10
PD3 11
PE0 12
PE1 13
PE2 14
PE3 15
PF0 16
PF1 17
PF2 18
PF3 19
TEST 20
Vss 21
42 CL0
41 VGG
40 PB3
39 PB2
38 PB1
37 PB0
36 PA3
35 PA2
34 PA1
33 PA0
32 PI2
31 PI1
30 PI0
29 PH3
28 PH2
27 PH1
26 PH0
25 PG3
24 PG2
23 PG1
22 PG0
µPD546C
Q701

CL0,1: Clock oscillator LC (external)
INT: Interrupt RES: Reset
PA3-0: Input port A3-0
PB3-0: Input port A3-0
PC3-0: Input/output port C3-0
PD3-0: Input/output port D3-0
PE3-0: Output port E3-0
PF3-0: Output port F3-0
PG3-0: Output port G3-0
PH3-0: Output port H3-0
PI2-0: Output port I2-0
TEST: Test

Fig. 2.1 Terminal arrangement (front view)

Block diagram


PI 2~0
PH3~0
PG3~0
PF3~0
PE3~0
PD3~0
PC3~0
PB3~0
PA3~0
I
H
G
F
E
D
C
B
A
UP/DOWN COUNTER
INSTRUCTION-BUS 8bit
RAM DECODER
DPL
DPH
RAM 96× 4
RAM BUFFER
P-BUS
Q-BUS 4bit
ALU
C
C'
Acc
TIMER
4bit
8bit
CONTROL & DECODE
ROM 2000×8
PC
STACK 0
STACK 1
STACK 2
INTERRUPT CONTROL
I/O INTERFACE
CLOCK GENERATOR
CL0
CL1
INT
RES

DP: Data pointer
ALU: Operation unit
ACC: Accumulator
PC: ~~Program counter~~
C: Carry F/F
C': Carry F/F

Fig. 2.2 Block diagram

Table 2.1 Functions of input/output signals

No.	Signal	Function	Description	Remarks
1	CL1	Clock 1	Pin 1 on clock oscillator LC	
2 3 4 5	PC0 PC1 PC2 PC3	Input/output port C	E. F. G. H. } Keyboard strobe signal and 7-segment lamp signal	Not used as input terminal.
6	INT	Interrupt input	Counter pulse input (detects tape end)	
7	RES	Reset input	Initial reset input	
8 9 10 11	PD0 PD1 PD2 PD3	Input/output port D	A. B. } Operation button strobe signal C. D. } Keyboard strobe signal } 7-segment lamp signal Lamp signal, PM, ERROR lamp strobe signal	No used as input terminal.
12 13 14 15	PE0 PE1 PE2 PE3	Output port E	(4) SELECTOR control signal — ERROR lamp signal (3) PROGRAM MODE control signal (2) COUNTER MEMORY control signal — PM lamp signal (1) TIMER control signal } 7-segment lamp strobe signal	
16 17 18 19	PF0 PF1 PF2 PF3	Output port F	TIMER ON LED lamp signal TIMER OFF LED lamp signal REC LED lamp signal PRG PAUSE LED lamp signal	
20	TEST	Test input	Not used; connected to Vss	
21	Vss	Power supply	+10V ±1V	
22 23 24 25	PG0 PG1 PG2 PG3	Output port G	TIMER ON signal TIMER LED lamp signal RAM LED lamp signal SAM LED lamp signal	
26 27 28 29	PH0 PH1 PH2 PH3	Output port H	FAST FF REW C/R (CUE/REVIEW) } Tape deck operation mode control signal	
30 31 32	PI0 PI1 PI2	Output port I	PAUSE PLAY REC	
33 34 35 36	PA0 PA1 PA2 PA3	Input port A	Power frequency select signal Power sync signal Program detect signal Time display select signal	
37 38 39 40	PB0 PB1 PB2 PB3	Input port B	4. 3. 2. 1. } Program signal operation signal	
41	V_{GG}	GND	0V	
42	CLO	Clock 0	Pin 0 on clock oscillator LC	

Control signal input circuit

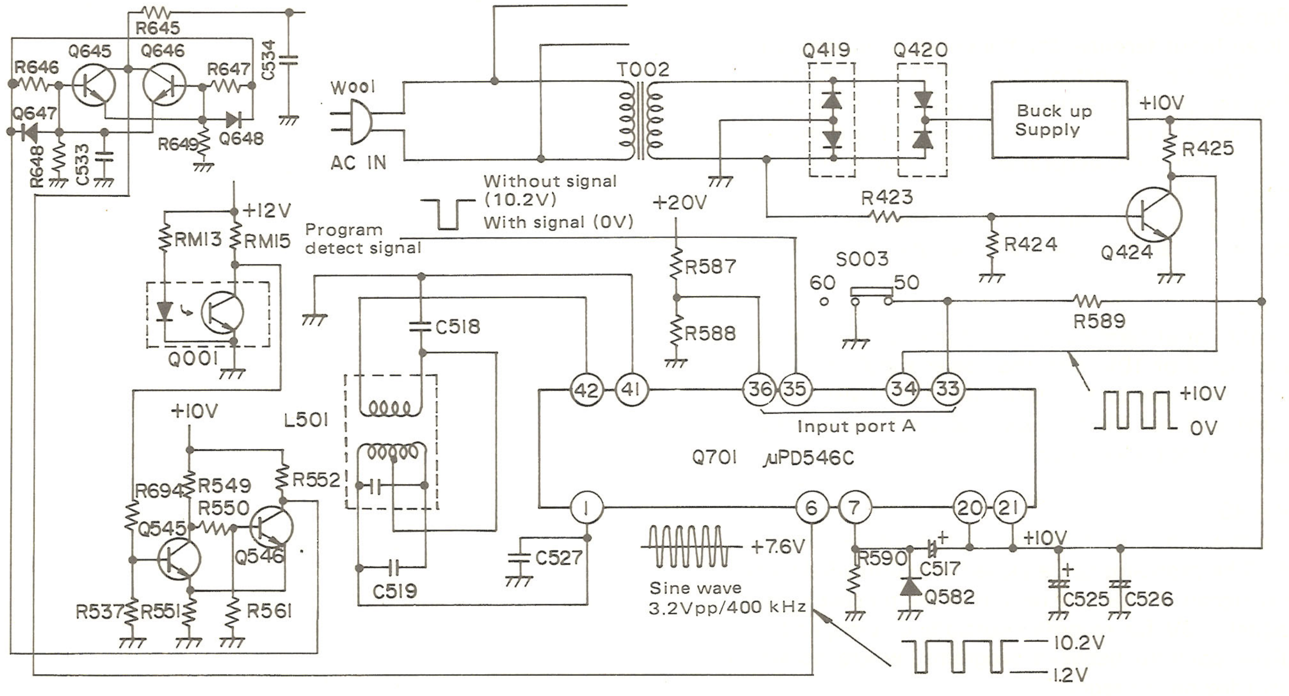

R645
R646
Q645
Q646
R647
C534
Q647
R648
C533
R649
Q648
W001
AC IN
T002
Q419
Q420
Buck up Supply
+10V
R425
R423
R424
Q424
Without signal (10.2V)
With signal (0V)
+20V
+12V
RM13
RM15
Program detect signal
Q001
R587
R588
S003
60
50
R589
C518
L501
+10V
R694
R549
R550
R552
Q545
Q546
R537
R551
R561
42
41
36
35
34
33
Input port A
Q701 µPD546C
1
6
7
20
21
C527
C519
+7.6V
Sine wave 3.2Vpp/400 kHz
R590
C517
Q582
+10V
C525
C526
10.2V
1.2V
+10V
0V

Fig. 2.3 Control signal input circuit

The Items (1) through (8) below are basic requirements for operating the microcomputer.

(1) Pin 1, 42

Pin 1 and pin 42 are the external terminals of the clock oscillator LC. The internal circuits of the microcomputer must be synchronized with the clock signal for proper operation. Incorrect oscillation of clock signal will result in misoperation of the microcomputer.

The clock signal at pin 1 should be a sine wave signal of about 3.2 Vpp/400 kHz (including a 7.6V DC component).

(2) Pin 6

Pin 6 is the counter pulse input terminal. Pulses are counted by the up/down counter in the microcomputer. In the PLAY, FF or PAUSE mode, the pulses are counted up; in the REW or REVIEW mode they are counted down. When no counter pulses are preset at this terminal and tape is being transported, the COUNTER MEMORY will not function.

If the pulse input duration is less than 2.0 seconds, the tape deck stops automatically.

(3) Pin 7

Pin 7 is the reset signal input terminal. When a high level signal is applied to it, the internal circuits of the microcomputer are reset and all functions stop.

Pin 7 becomes high level just after the power is connected to the SD8000, regardless of whether the power switch is ON or OFF. Under normal circumstances, the voltage at Pin 7 is 0V.

(4) Pin 20, 21

Pin 20 is a test terminal and Pin 21 is the power terminal.

The test terminal is connected to the power supply since it is not used. The power voltage should be +10V ±1V.

(5) Pin 33

This is an input terminal for the power frequency select signal. The time signal of the SD8000 is obtained by dividing the power frequency, so the frequency divider in the microcomputer needs to be given the proper frequency division ratio according to the power frequency (50 Hz or 60 Hz).

When Pin 33 is 0V (GND), the frequency division ratio is 1/50, and when it is 10V, then the ratio is 1/60.

(6) Pin 34

This is the input terminal for the time and timer signals. A pulse signal of 10V with the power supply frequency should be applied to this terminal. Otherwise the correct time will not be indicated and the timer recording function will not operate correctly.

(7) Pin 35

This is the input terminal for the program detection signal. The programs to be played are controlled by the applied signals. When the deck is in the playback mode, this signal is 0V for recorded portions of tape, and 10V for blank portions between programs (where no signal are recorded on the tape).

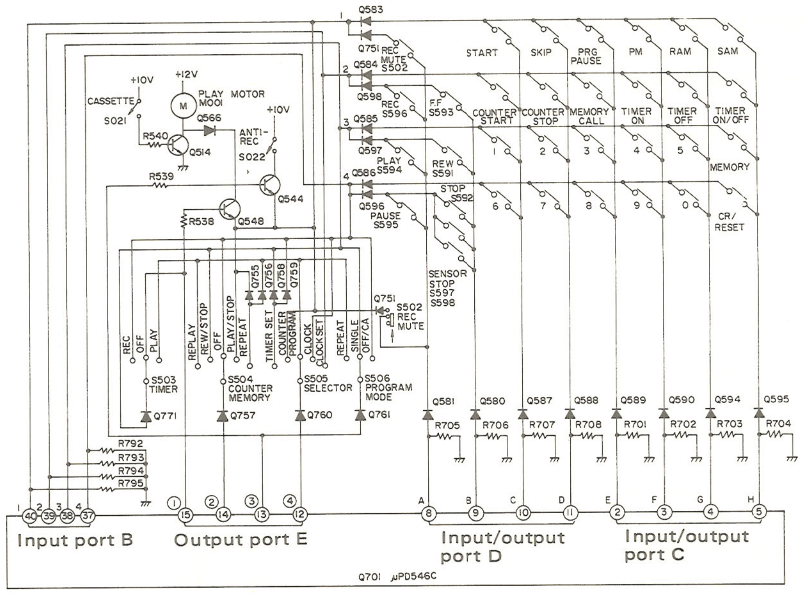
(8) Pin 36

Normally, a voltage of 10V is applied to this terminal. When the voltage becomes 0V, the display automatically indicates the time.

(9) Pin 31

This is the GND terminal.

Fig. 2.4 Operation/program signal input circuit

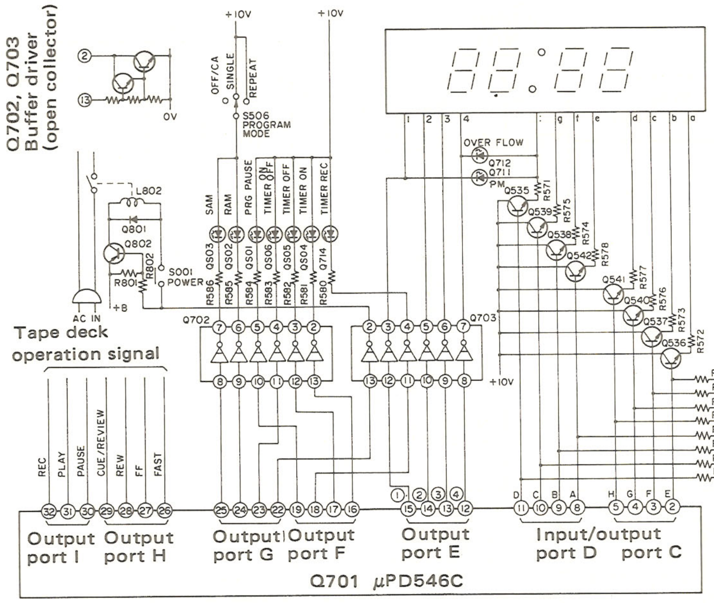

START
SKIP
PRG PAUSE
PM
RAM
SAM
COUNTER START
COUNTER STOP
MEMORY CALL
TIMER ON
TIMER OFF
TIMER ON/OFF
MEMORY
CR/RESET
CASSETTE
PLAY MOTOR
ANTI-REC
SENSOR STOP
REC MUTE
S503 TIMER
S504 COUNTER MEMORY
S505 SELECTOR
S506 PROGRAM MODE
Input port B
Output port E
Input/output port D
Input/output port C
Q701 μPD546C

Besides the signals outlined previously, there are the input circuits for the operation signals (PLAY, FF, etc.) to select the mode of operation of the SD8000 and for the program setting signal (START, SKIP, etc.). Refer to Fig. 2.4.

In the microcomputer, these signals are synchronized with the clock signal and processed together to determine the mode of operation with the aid of the operation and program switches, input and output signals and their timing.

Operation/indication signal output circuit
Refer to Fig. 2.5

Fig. 2.5 Control/Indication signal output circuit


Q702, Q703 Buffer driver (open collector)
OFF/CA
SINGLE
REPEAT
S506 PROGRAM MODE
OVER FLOW
PM
SAM
RAM
PRG PAUSE
TIMER ON
TIMER OFF
TIMER REC
S001 POWER
AC IN
Tape deck operation signal
REC
PLAY
PAUSE
CUE/REVIEW
REW
FF
FAST
Output port I
Output port H
Output port G
Output port F
Output port E
Input/output port D
port C
Q701 μPD546C

(1) Tape deck operation signal

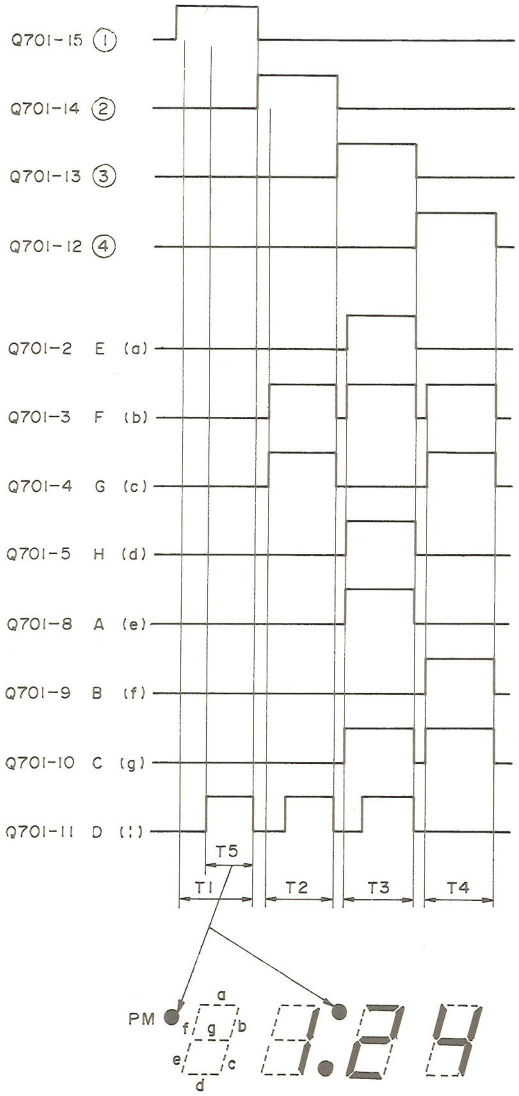
This signal is delivered from output ports H and I to determine the mode of operation of the tape deck. For example, in the PLAY mode, a high level signal is output by Pin 31 and the tape deck remains in the PLAY mode as long as the signal is high level. In the timer recording (or playback) mode, a high level signal is output from Pin 22 of output port G. For the functions of the circuits in each operating mode, refer to Section 4 "Tape Operation".

(2) Indication signal – 1

This signal is delivered from input/output ports C and D and output port E to drive the 7-segment LED, PM LED and OVER-FLOW LED in the display. For example, the following steps are taken for the display to indicate "1:24". Refer to Fig. 2.6.

a. Strobe signals (1) through (4) are output from output port E, lighting the 7-segment LEDs one by one starting from the top digit.
b. The 7-segment lamp signals are output from output ports C and D.
c. The lamps of all the digits will light in sequence, but they appear to light simultaneously because the driving cycle is very short.

Fig. 2-6 Principle of displaying "1:24"


Q701-15 ①
Q701-14 ②
Q701-13 ③
Q701-12 ④
Q701-2 E (a)
Q701-3 F (b)
Q701-4 G (c)
Q701-5 H (d)
Q701-8 A (e)
Q701-9 B (f)
Q701-10 C (g)
Q701-11 D (:)
T5
T1
T2
T3
T4
PM
a
f
g
b
e
c
d

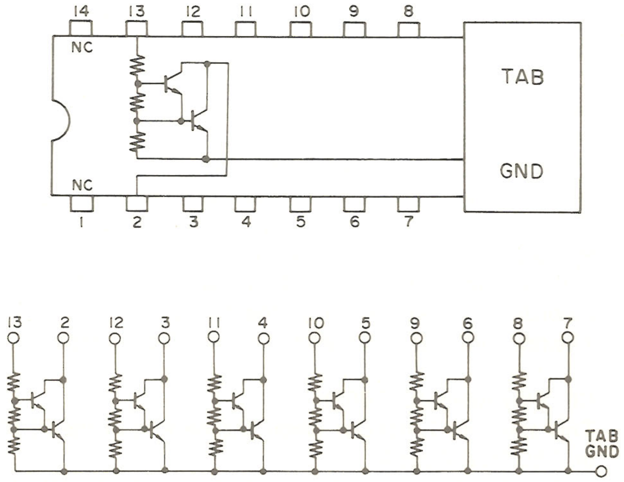
(3) Indication signal – 2

The LED lamp signals, used to indicate the mode of operation of the microcomputer, are output from output port F and output port G (excluding Pin 22).

The conditions required to light the LEDs are given in section 5 "Programming".

The Q702 and Q703 (μPA57C) are wired as shown in Fig. 2.7 to serve as a buffer driver.

Fig. 2-7 μPA57C


14
13
12
11
10
9
8
NC
TAB
GND
NC
1
2
3
4
5
6
7
TAB
GND

μPA57C

3. Circuit

This Section is intended to explain the functions of the motors, solenoids and related circuits.

3.1 Motor and solenoid

(1) Play motor (M001)

This FG servo DC motor is always rotating while a cassette is loaded and drives the capstan, i.e. the tape, at a constant speed. Winding torque is applied to the right reel disk during the PLAY or REC/PLAY mode.

(2) Reel motor (M002)

This FG servo DC motor is used to set the tape in FF, REW or CUE/REVIEW mode (CUE and REVIEW are performed in the fast forward and rewind modes respectively while programs are being played).

In each mode, the tape speed is maintained constant by means of the servo control system of the motor.

The reel motor rotates in the reverse direction when the deck is changed from the fast forward mode to the rewind mode. Either the left or right reel disk is driven according to the direction of the motor.

The reel motor is also used to remove slack in tape.

(3) Play solenoid (L001)

This solenoid functions when the deck is in the PLAY or REC/PLAY mode.

a. The head base is lifted and the head contacts the tape.
b. The pinch roller contacts the capstan and the tape starts running.
c. Slight braking is applied to the left reel disk to provide back tension to the tape.
d. The fast forward idler is set in the neutral position.

(4) Brake solenoid (L002)

This solenoid functions when the deck is in the PLAY, REC/PLAY, FF, REW, or CUE/REVIEW mode.

When it operates, the left and right reel disks are released to drive the tape.

(5) CUE/REV solenoid (L003)

This solenoid functions when the deck is in the CUE/REVIEW, PAUSE or REC/PAUSE mode.

In the CUE/REVIEW mode, the head base is lifted up to its middle position to permit the tape to contact the head. In the PAUSE or REC/PLAY mode, the capstan is released from the pinch roller and, at the same time, the play idler is disengaged from the reel to stop tape movement.

(6) Recording solenoid (L004)

This solenoid functions when the tape is in the REC/PLAY or REC/PAUSE mode to set the amplifier to the recording mode. When this solenoid is inoperative, the amplifier is in the playback mode.

3.2 Back-up Circuit

When the power switch is OFF, back-up power is supplied to the microcomputer via T002, rectifier (Q419, Q424) and voltage regulator circuit (Q421 ~ Q423). In this case, the voltage at Pin 36 of Q701 is 0V, thus time is indicated on the display.

During back-up operation, the programs stored in memory remain uncleared.

3.3 Solenoid drive voltage select circuit

The SD8000 is equipped with 4 solenoids. To ensure proper operation of these solenoids, a sufficient drive current is required.

If a large current flows into a solenoid, the solenoid is overheated which, in turn, increases the winding resistance and reduces the force of attraction of the solenoid. However, once the solenoid has been operated with a large current, it operates stable even with a relatively small current.

The SD8000 employs a solenoid drive voltage select circuit to select the operating voltage according to whether the solenoid is in the operating mode or holding mode.

Fig. 3.1 and Fig. 3.2 show the operating principles of the circuit in the PLAY mode.

Fig. 3-1 Solenoid drive voltage select circuit

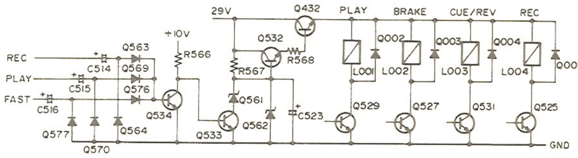
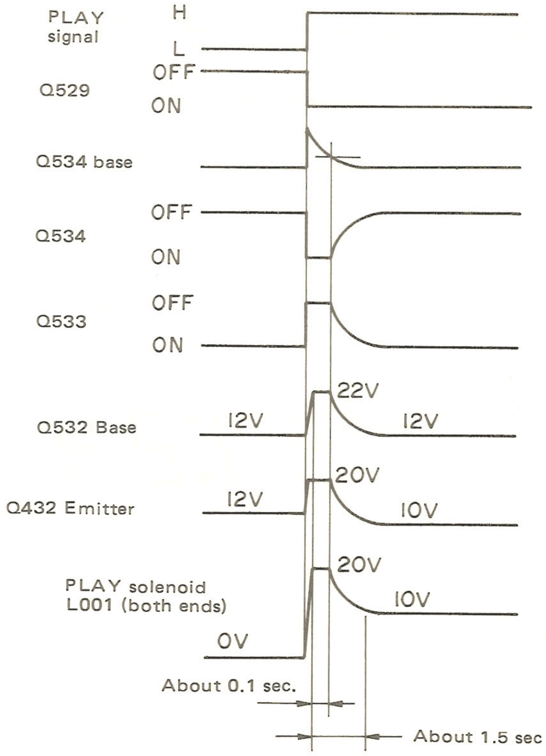


Fig. 3-2 Solenoid operation



a. The PLAY signal level in the output of the microcomputer rises to "H" (this signal turns on Q529 and Q527 through a circuit via a separate route). (Fig. 3-1)
b. The PLAY signal is differentiated, then passes through Q569 and turns ON Q534 momentarily. Q533 is OFF when Q534 is ON.
c. When Q533 is OFF, a bias voltage of about 22V is applied to the base of Q532 through Zener diode Q562. At this time, the output of the emitter of Q432 is about 20V.
Since Q529 and Q527 are ON, a voltage of 20V is applied to the PLAY solenoid L001 and the BRAKE solenoid L002 and hence they are driven by a large current.
d. When Q534 is OFF, Q533 is ON so the base of Q532 is biased by Q561. As a result, the bias voltage is reduced to about 12V, causing the voltage at the emitter of Q432 to be reduced to about 10V and thus the solenoid is held closed at about 10V during the PLAY mode.

3.4 Tape end detect circuit

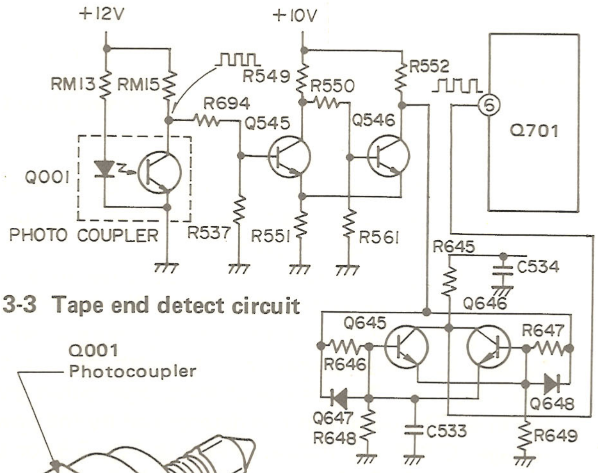

+12V
+10V
RM13
RM15
R549
R694
R550
R552
Q545
Q546
6
Q701
Q001
PHOTO COUPLER
R537
R551
R561
R645
C534
Q646
Q645
R647
R646
Q647
R648
C533
R649
Q648

Fig. 3-3 Tape end detect circuit

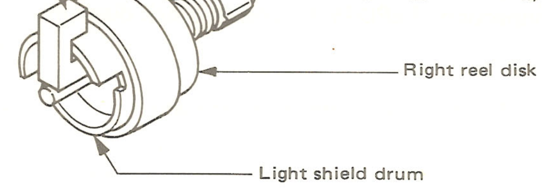
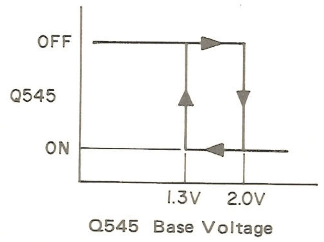

Q001
Photocoupler
Right reel disk
Light shield drum

Fig. 3-4 Tapedrive detect mechanism

Fig. 3.3 shows the counter pulse generator circuit which also serves as the tape end detection circuit. Detection of tape end is accomplished by the mechanism shown in Fig. 3.4 When the right reel disk is rotating, the light shield drum attached to the reel disk also rotates.
The light shield drum has two slits; photocoupler Q001 contains a light emission diode and a photo transistor. The light from the light emission diode arrives at the photo transistor only when the slits in the light shield drum pass through the photocoupler, energizing the photo transistor.
When the light is blocked, the photo transistor is OFF. In other words, the photo transistor turns on twice for each rotation of the right reel disk. Since the photo transistor's ON time is not stabilized and since it is de-energized between ON and OFF according to the position of the light shield drum, the waveform of the signal must be shaped by the Schmitt circuit consisting of Q545 and Q546.
As shown in Fig. 3.5, Q545 turns ON when the voltage is below 1.3V. Operation of Q546 is the reverse of Q545.
The shaped output waveform is applied to Pin 6 of Q701.
When the output pulse from Q546 stops in the PLAY, FF or REW mode, the microcomputer detects the end of the tape and the tape stops 1.5-2 seconds later.

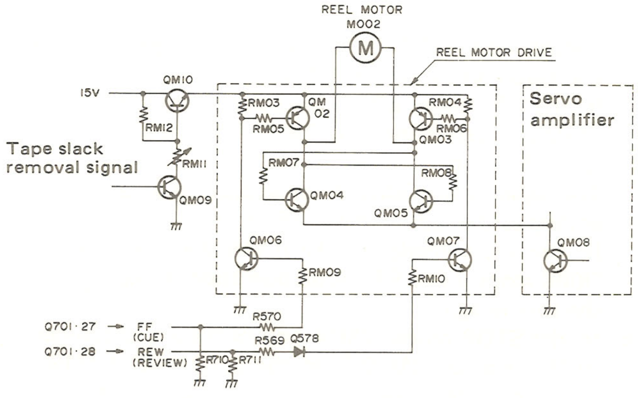
Fig. 3-5 Schmitt operation



3.5 Reel motor drive circuit

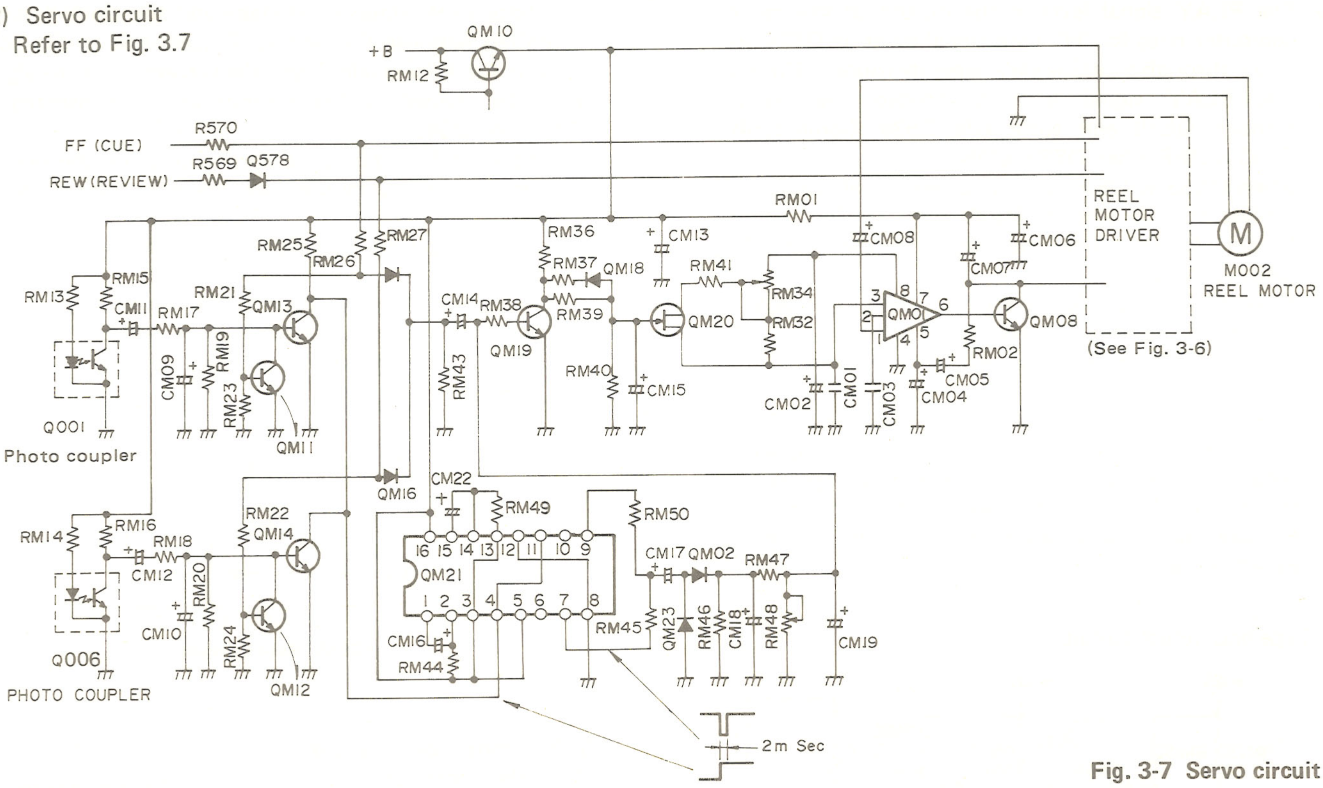
(1) Reel motor driver

Fig. 3-6 Reel motor driver


REEL MOTOR
M002
M
REEL MOTOR DRIVE
15V
QM10
RM12
Tape slack removal signal
RM11
QM09
RM03
QM 02
RM05
RM04
RM06
QM03
RM07
RM08
QM04
QM05
Servo amplifier
QM06
QM07
QM08
RM09
RM10
R570
Q701·27
FF (CUE)
Q701·28
REW (REVIEW)
R569
Q578
R710
R711

Under normal circumstances, QM09 is OFF and the base of QM10 is biased via RM12. The voltage at the emitter of QM10 is about 14V (load). When a high level FF signal is output from the microcomputer via Q701, QM06 turns ON via R570 and RM09. This reduces the signal level at the collector and thus QM02 turns ON. As a result, a current flows into the base of QM05 which will turn ON.
In the reel motor M002, a current flows along the route QM02 – M002 – QM05 – QM08 so that motor runs in the counterclockwise direction (as viewed from the pulley side) to drive the right reel disk.
The transistor QM08 in the servo amplifier functions as a variable resistor, controlling the reel motor current to provide a constant tape speed (refer to Item 3-8 "I").
In the REW mode, QM07, QM03 and QM04 turn ON. In this case, a current flows into M002 along the route QM03 – M002 – QM04 – QM08, so the motor runs in the reverse direction of this FF mode.

(2) Servo circuit
Refer to Fig. 3.7



+B
QM10
RM12
FF (CUE)
R570
REW (REVIEW)
R569
Q578
RM01
REEL MOTOR DRIVER
M
M002
REEL MOTOR
(See Fig. 3-6)
RM25
RM26
RM27
RM36
CM13
CM08
CM06
CM07
RM37
QM18
RM41
RM34
RM32
QM20
QM01
QM08
RM02
CM05
CM04
CM01
CM02
CM03
CM14
RM38
RM39
QM19
RM40
CM15
RM43
RM13
RM15
CM11
RM17
RM21
QM13
CM09
RM19
RM23
QM11
Q001
Photo coupler
QM16
CM22
RM49
RM50
QM21
CM17
QM02
RM47
RM45
QM23
RM46
CM18
RM48
CM19
CM16
RM44
RM14
RM16
RM18
CM12
RM22
QM14
RM20
CM10
RM24
QM12
Q006
PHOTO COUPLER
2m Sec

Fig. 3-7 Servo circuit

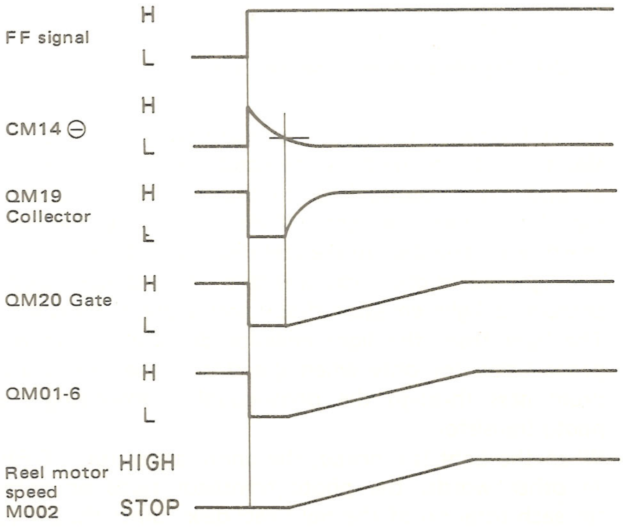
a. Photocoupler Q001 is located on the right reel disk and Q006 on the left reel disk.

b. In the FF mode, a high level signal from the microcomputer passes through R507, RM26 and RM21 to turn QM11 on.
The signal from Q001 is not applied to other circuits as long as the tape is in the FF mode.
In the REW mode, QM12 is ON and the signal to Q006 stops. (The FF mode operation is explained in the following.)

c. In the STOP mode, CM14 and CM19 are uncharged, so the base of QM19 is at the GND level. QM19 is OFF and the collector voltage of QM19 is about 8.2V. When the FF signal of H level is output from the microcomputer, CM19 is charged through RM26, QM15 and CM14. The FF signal also biases QM19 for about 150 msec via RM38. Therefore, QM19 is turned ON and CM15 is quickly discharged through RM37 and QM18.
When the voltage (QM20 gate voltage) charged in CM15 drops, the resistance across the drain and source of QM20 is increased. With this resistance increased, the DC output voltage from Pin 6 of QM01 drops and the QM08 collector current (reel motor current) is decreased. Therefore, the reel motor starts running at a slower speed just after entering the FF mode. When CM14 is charged with the FAST signal, QM19's base voltage drops and the collector voltage is increased. CM15 is charged through RM36 and RM39 with a long time constant so CM20's gate voltage is increased slowly. As the gate voltage is increased, the drain-source resistance is decreased gradually, while QM01's output voltage is slowly increased. Thus, QM08's collector current is increased, thereby increasing the speed of the reel motor gradually. Since the reel motor starts running at a slow speed, the tape will not become slack.

d. In the FF (REW) mode, the tape drive detecting signal is fed from QM14 (QM13) to Pin 4 of QM21. QM21 (μPD4528C) is a unistable multivibrator which outputs low level pulses with a width of about 2 msec, from Pin 7 at the rise of the trigger pulses given to Pin 4. The pulse-width is determined by the power voltage, CM16 and RM44. Refer to Fig. 3.8 for the connection of μPD4528C and its block diagram.

Fig. 3-8-1 Reel motor rising characteristic



e. The output of QM21 is rectified, smoothed and applied to the base of QM19 as a speed control signal. The functions of the servo motor in the FF mode are as follows:

* At the start of tape, the left reel rotates at a slow speed because there is a large amount of tape. When the tape on the left reel is decreased, the speed of the reel is increased gradually and the interval of the input (trigger) pulses from Pin 7 of QM21 becomes shorter.

* With the trigger pulse-interval becoming shorter, the interval of the output pulses from Pin 7 of QM21 also become shorter.

* The interval of the pulses which are differentiated by CM17 and fed to the rectifier circuit become shorter, so the output voltage of the smoothing circuit is increased which increases the voltage at the base of QM19.

* With the QM19 base voltage increased, the collector current is increased, decreasing the collector voltage. Thus, the voltage at the gate of QM20 is lowered.

* With the gate voltage lowered, the drain-source resistance is increased, lowering the QM01 output voltage which decreases the QM08 collector current.

* The QM08 collector current is the current flowing into the reel motor. When this current is decreased, the motor runs at a slower speed.

The reel motor drives the right reel disk. If the motor were to run at a constant speed, the tape would run slowly at the beginning of tape and at very high speed at the end of the tape. The servo motor is used to make the tape speed constant throughout the entire length of the tape by reducing the speed of the reel motor while the tape is running.

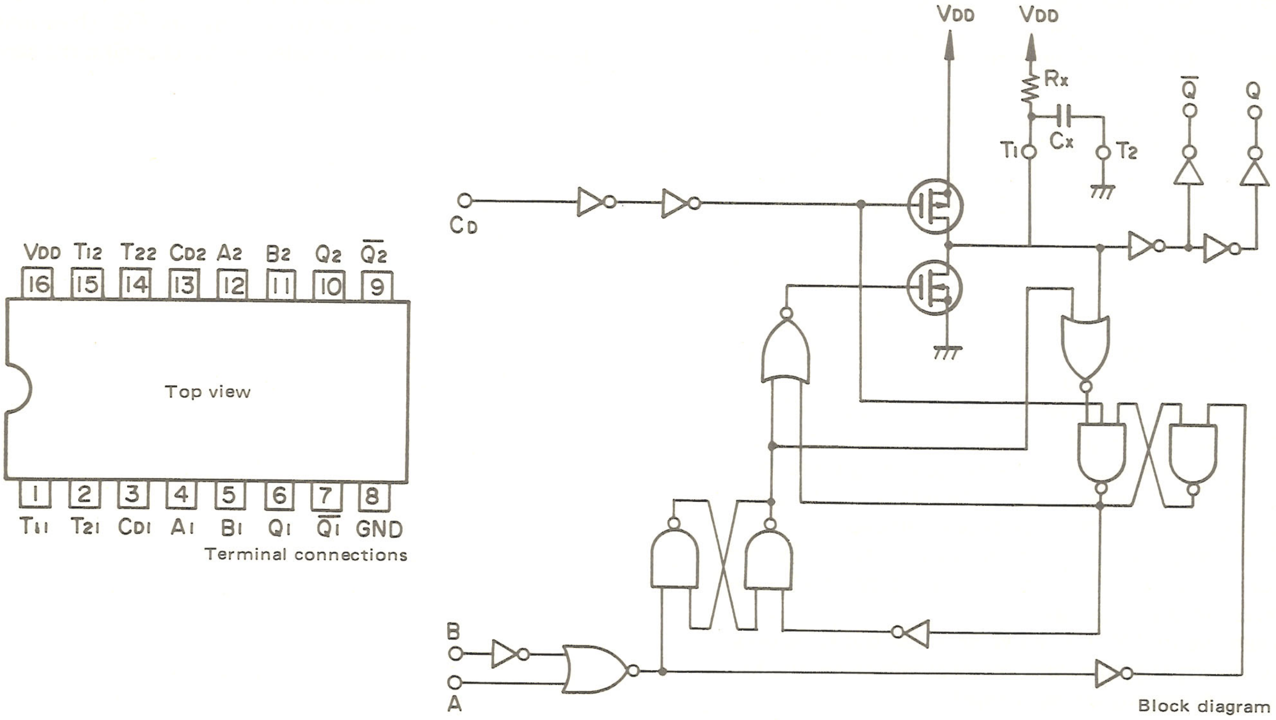
f. The pulse-width and voltages at the beginning and end of tape are as follows:

	Beginning of tape	End of tape
QM21-4 Trigger pulse interval	50 msec	30 msec
CM19 "+" Smoothing circuit output voltage	0.25V	0.62V
QM19 Collector voltage	8.8V	1.7V
QM20 Gate voltage	0.75V	0.15V
QM08 Collector voltage	5.8V	7.8V
Reel motor speed	Fast	Slow

g. The purpose of maintaining the tape speed constant in every fast tape-feeding mode is to ensure stable operation of the program detecting function explained in a later section.

h. The semi-fixed resistor RM34 in Fig. 3.7 is used to determine the maximum speed of the reel motor, while RM48 is used to determine the range of speed of the reel motor or the average speed of the tape.

Fig. 3-8 μPD4528C unistable multivibrator



Terminal connections

Block diagram

3.6 Tape slack removal circuit

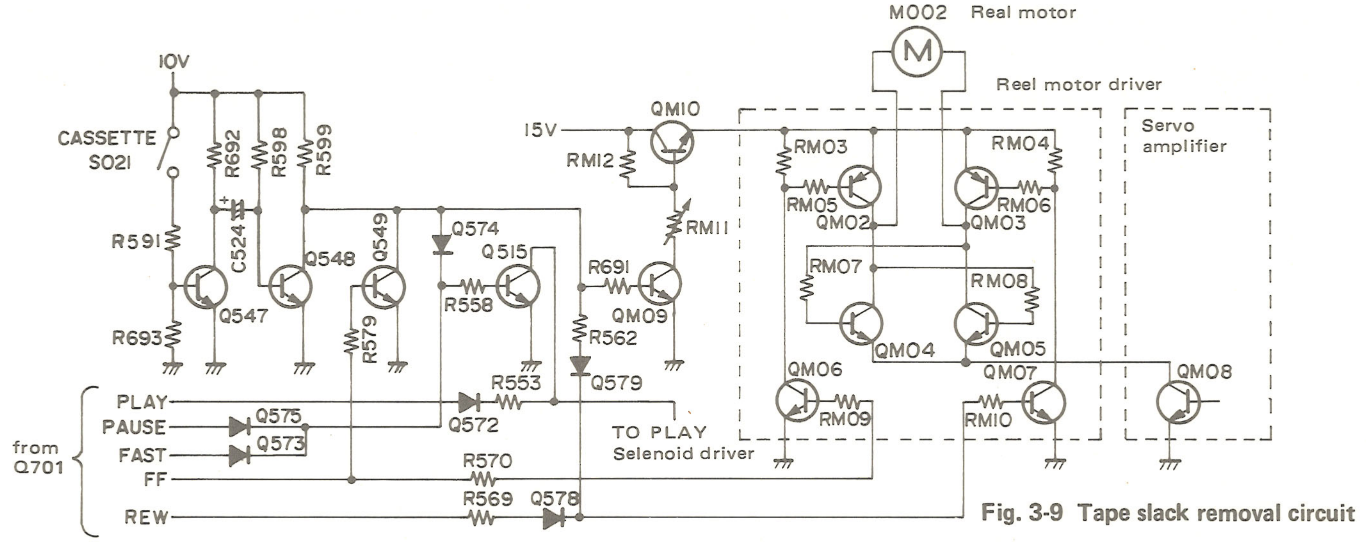

M002 Real motor
Reel motor driver
Servo amplifier
10V
CASSETTE
S021
R692
R598
R599
C524
R591
Q547
Q548
Q549
R693
R579
Q574
Q515
R558
15V
QM10
RM12
RM11
R691
QM09
R562
R553
Q579
Q572
TO PLAY
Selenoid driver
RM03
RM04
RM05
RM06
QM02
QM03
RM07
RM08
QM04
QM05
QM06
QM07
RM09
RM10
QM08
from
Q701
PLAY
PAUSE
FAST
FF
REW
Q575
Q573
R570
R569
Q578

Fig. 3-9 Tape slack removal circuit

If the tape in the cassette is slack, it can result in tangling of the tape in the tape drive mechanism. The SD8000 is equipped with a tape slack removal circuit which removes any slack tape automatically when a cassette is loaded in the tape deck or when the power switch is set to ON (not when backup is power ON). Refer to Fig. 3.9.
When the power of the tape deck is set to ON without a cassette loaded, the cassette IN switch (S021) is open and Q547 is OFF, but Q548 is ON.

When a cassette is loaded, S021 is closed and Q547 turns on. The base of Q548 is grounded through C524 and Q548 turns off for about 1 second.
While Q548 is OFF, a high level signal is output from the collector of Q548 to perform the following functions:

(1) Q515 is switched ON via Q574 and R558 to drop the PLAY signal level to L so that the deck is not set in the PLAY mode until the slack in the tape is removed.
(2) QM09 is switched ON through R691. Therefore, the voltage divided by RM11 and RM12 is applied to the base of QM10, then the emitter output voltage of QM10 drops to about 8V (at unloaded time). As a result, the torque of the reel motor is lowered to prevent the tape from being wound more than necessary.
(3) QM07 is switched ON via R562, Q579 and RM10. QM03 and QM04 are also ON and the same direction as the REW mode.
The left and right reel disks are braked while the tape slack is being removed, but less braking is applied to the left reel base than to the right reel base so the tape is wound onto the left reel with a low driving torque as the slack tape is removed.
When the power is turned on with a cassette loaded (for timer recording, etc.), slack tape is also removed in the same way.
When the PLAY, FF, REW or STOP button is pressed during the tape slack removal operation, the following functions are performed:
(4) PLAY button
Q515 is switched ON and the PLAY signal level is reduced. Slack tape is removed and the tape is set to the PLAY mode after Q522 turns OFF.
(5) FF button
Q549 is switched ON via R579, releasing the tape slack removal operation. The deck is set in the FF mode.
(6) REW button
The deck is set to the REW mode immediately. The torque of the reel motor remains low during the slack tape removal operation.
(7) STOP button
The slack tape removal operation contrinues.

3.7 Tape Speed Selector Circuit

The tape speed in the PLAY or REC/PLAY mode is determined by the speed of the capstan motor (M001). This motor is servo controlled by its FG (frequency generator). The speed is selected by changing the series resistor in the frequency generator.

3.8 Program Detector Circuit

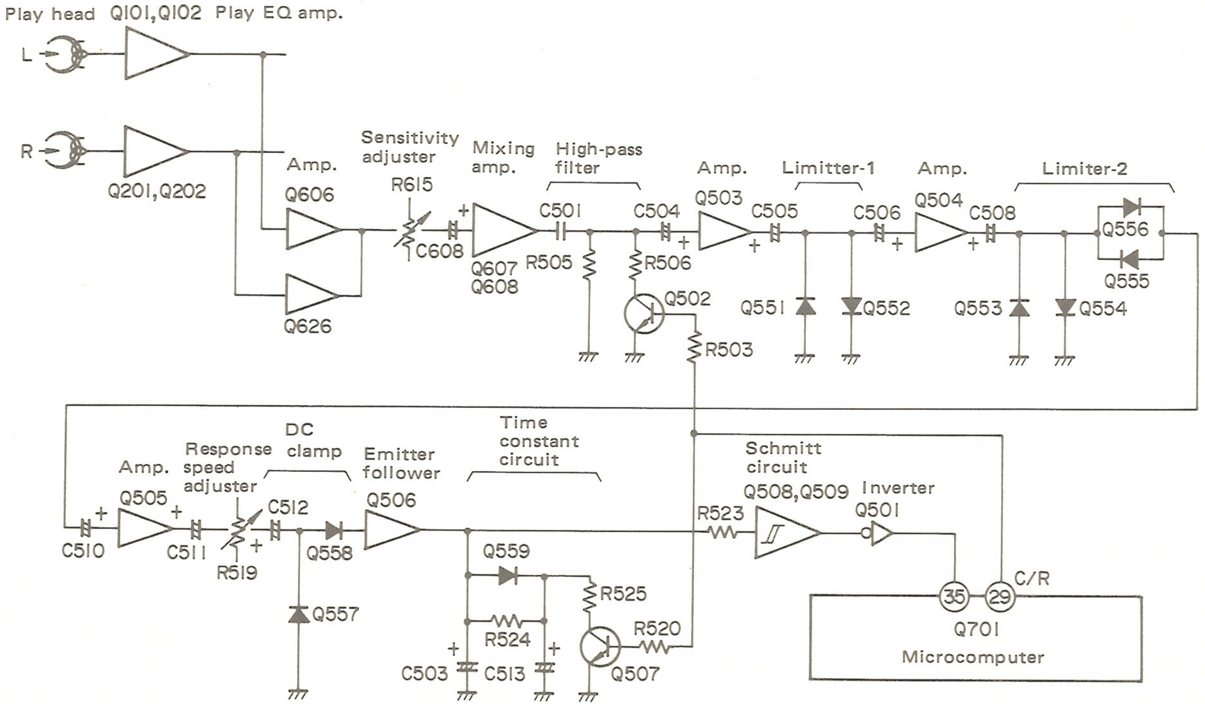
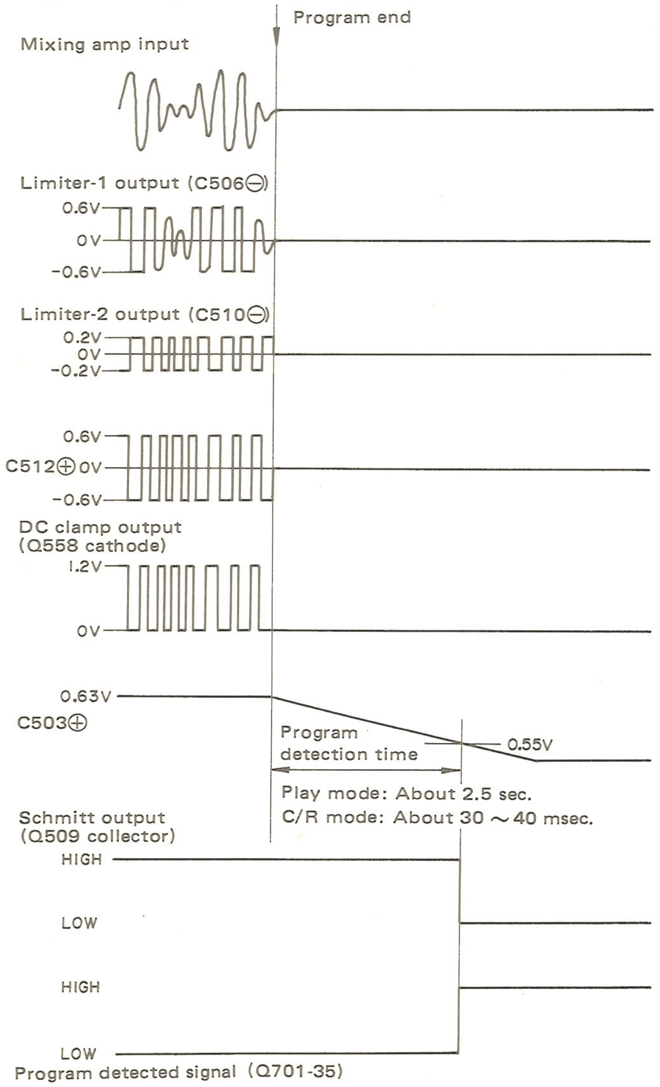

Play head
Q101,Q102
Play EQ amp.
L
R
Q201,Q202
Amp.
Q606
Q626
Sensitivity adjuster
R615
C608
Mixing amp.
Q607
Q608
High-pass filter
C501
R505
C504
R506
Q502
R503
Amp.
Q503
C505
Limitter-1
Q551
Q552
C506
Amp.
Q504
C508
Limiter-2
Q553
Q554
Q556
Q555
DC clamp
Response speed adjuster
Amp.
Q505
C510
C511
R519
C512
Q558
Q557
Emitter follower
Q506
Time constant circuit
Q559
R525
R524
R520
C503
C513
Q507
Schmitt circuit
Q508,Q509
R523
Inverter
Q501
35
29
C/R
Q701
Microcomputer

Fig. 3-10 Program detector circuit block diagram

Fig. 3-11 Program detected signal



The program detector circuit detects blank spaces between programs on tape and feeds a high level program control signal to pin 35 of the microcomputer. Fig. 3.10 is a block diagram of the circuit an Fig. 3.11 shows the waveform at each point.

a. The play signals from the play EQ amplifiers of the left and right channels are amplified and mixed by Q606 and Q626.

b. The mixed signal is further amplified by Q503 via the sensitivity adjuster and the high-pass filter.

c. The high-pass filter turns on and off Q502 to change the cut-off frequency.
In the CUE/REVIEW mode, the tape runs faster than in the PLAY mode and the play frequency band is shifted up so Q502 turns on. The cut-off frequency of the high-pass filter is shifted up by inserting R506 in parallel with R505.
When the tape runs at a high speed as in the CUE/REVIEW Mode, the play signal level is increased. This signal is controlled when R506 is grounded by Q502 and the circuit impedance is reduced.

d. The output signal from Q503 is fed to limiter-1 consisting of Q551 and Q552 to limit the maximum amplitude to about 0.6V.

e. The output of limiter-1 is amplified by Q504 and is fed to limiter-2 consisting of Q553—Q556.
Amplifier Q504 and limiter-2 amplify low level signals whose amplitude was not limited by limiter-1. When the signal is limited, the play signal is changed to a pulse signal. The amplitude of the output signal of limiter-2 is 0V ± 0.2V.

f. This signal is amplified by Q505 and fed to the DC clamping circuit via the response speed control R519 to shift the input signal from R519, which is deflecting in both the positive and negative directions with respect to 0V, to the positive side without changing its amplitude.

g. The DC shifted signal pulses pass through emitter follower Q506 to charge C503 and C513 in the time constant circuit.
When recorded tape is being played back, charging pulses are continuously applied to C503.

h. When the signal is present, the charging voltage at C503 is about 0.63V. Q508 and Q509 in the Schmitt circuit are ON and OFF, respectively; Q501 is ON while Q509 is OFF. Pin 35 of the microcomputer is at low level.

i. When left and right channel play signals are not present, the pulses charging C503 stop so C503 discharges into the Schmitt circuit via R523.
When the potential of C503 drops to about 0.55V, the Schmitt circuit is inverted and Q501 turns off. As a result, a "program detected" signal is applied to Pin 35 of the microcomputer.

j. In the PLAY mode, the program detection time required to apply a detecting signal after the play signal stops is about 2.5 seconds (in other words, a blank space of about 3-5 seconds is required between programs).

k. In the CUE/REVIEW mode, the tape runs at a high speed, so the program detecting time needs to be reduced. In this case, C507 is turned on to discharge C503 and C513 through R525 and Q507 so that a detecting time of about 30 mSec to 40 mSec is obtained.

l. In the CUE/REVIEW mode, if the tape speed varied, the detecting time would vary, resulting in failure to detect programs.
To prevent this, the reel motor is servo controlled to maintain a constant tape speed.

m. Control R519 is used to adjust the amplitude of the pulses fed to the rectifier circuit. By changing the pulse amplitude, the charging voltage of the time constant circuit is varied together with the detecting time.

n. Recorded signals of which level indicated with the peak level meter exceeds —35 dB are judged as program signal.
The signal level can be adjusted with R615.

4. Tape Operation

During programming operation, the mode of tape operation cannot be selected with the pushbuttons.

The following describes the functions of pushbuttons and related circuits. Unless it is stated otherwise, the deck is in the STOP mode before any pushbuttons are pressed.

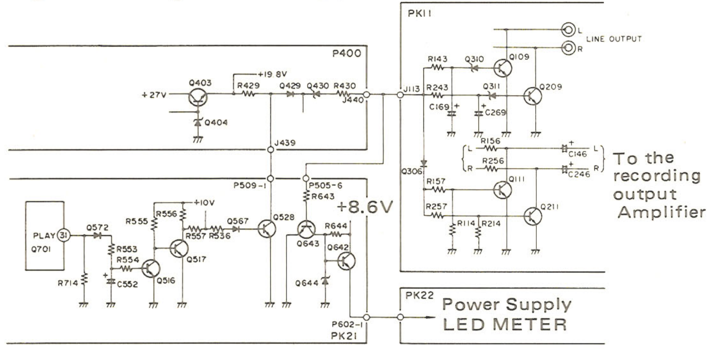
4.1 PLAY mode

With the PLAY button pressed, circuit Q701 in the microcomputer is set to the PLAY mode and a high level PLAY signal is output from pin 31. This signal passes through Q572, R553 and R554 to turn on Q516.

At this time, Q517 is OFF and the signal at the collector is inverted from low to high level and the following operations are performed.

(1) Q528 is switched ON via R557, R536 and Q536 and the amplifier is set to the PLAY mode (see Fig. 4.1) as follows.

Fig. 4-1 Muting control circuit



a. Q643 is switched OFF and the voltage regulator circuit operates to supply power to the LED meter.

b. Q109 and Q209 are switched OFF to release the muting function of the play output circuit.

c. Q111 and Q211 are switched OFF to release the muting function of the recording output circuit.

(2) Q534 is switched ON for about 0.5 sec via R557, C515 and Q569. In the circuits following Q534, the solenoid drive voltage is selected as discribed previously (Item 3.3).

(3) Q523 and Q527 are switched ON via R557, Q568 and R596. The brake solenoid L002 is activated to release the braking of the reel disks.

(4) Q522 and Q529 are switched ON via R557 and R563. PLAY LED Q591 lights and play solenoid L001 is activated to set the deck in the PLAY mode.

4.2 REC/PLAY mode

The deck cannot be set to the REC/PLAY mode unless ANTI-REC switch S002 is open. Also, the deck cannot be set to this mode manually unless PROGRAM MODE switch S506 is in the OFF/CA position and COUNTER MEMORY switch S504 is in the OFF, REWIND/STOP or REWIND /REPLAY position.

(1) By pressing the PLAY and REC buttons simultaneously, a high level play signal and recording signal are present at Pin 31 and Pin 32 of the microcomputer, respectively. The deck is set to the PLAY mode by the play signal.

The recording signal functions as follows:

a. Q511 is switched ON via Q560, Q530 and R532. Q512 is OFF and Q513 and Q525 are ON.

b. REC LED Q593 is lit by Q513.

c. REC solenoid L004 is activated by Q525. REC/PLAY switches S101 and S102 in the amplifier are set to REC. The amplifier is set to the recording mode.

(2) If, during the PLAY mode, the PLAY and REC buttons are pressed at the same time, the deck is also set to the REC/PLAY mode.

In this case, the following operations are performed, as well as the operations given in a through c.

d. Q512 is switched OFF and the signal at the collector become high level. This signal passes through R535, C514 and Q563 to activate the solenoid drive voltage selector circuit following Q534. Thus, the voltage of the REC solenoid is switched.

(3) With REC/MUTE switch S502 pressed during the REC/PLAY mode, the recording amplifier is muted and hence the recording signal goes off. At this time, the display indicates second's digits automatically regardless of the position of the program setting switch. The display indicates 0-9 seconds repeatedly while S502 is pressed. As explained previously, a blank space of more than 3 seconds is required for proper operation of the program detection circuit, so that length of blank tape can be determined by the time indicated during the REC/MUTE operation.

4.3 PAUSE mode

(1) PLAY/PAUSE

If the PAUSE button is pressed when the deck is in the STOP, FF or REW mode, the PAUSE signal is not output. By pressing the PAUSE button during the PLAY mode, the PLAY signal (Pin 31 of the microcomputer) becomes low level and the PAUSE signal (Pin 31) becomes high level. With this, the tape is set to the STOP mode and the amplifier is muted.

The high level PAUSE signal has the following functions:

a. Q524 is switched ON via R541 and the PAUSE LED Q592 is lit.

b. Q515 is switched ON via Q575 and R558, discharging C522.

c. Q526 is switched ON via R542 (Q526 does not function at this time).

d. Q530 and Q531 are switched ON via R548, Q599 and R692. CUE/REV solenoid L004 is activated by Q531 (in this case, the solenoid drive voltage selector circuit does not operate). The CUE/REV solenoid sets the head base between the STOP and PLAY positions. When the PLAY button is pressed in the PLAY/PAUSE mode, the PAUSE signal level becomes low and the PLAY signal level becomes high.

The PAUSE signal goes off and then the PLAY signal comes on about 25 msec later. CUE/REV solenoid L003 is OFF and PLAY solenoid L001 is ON.

(2) REC/PAUSE

When the PAUSE button or the REC and PAUSE buttons are pressed in the REC/PLAY mode, the tape is set to the REC/PAUSE mode. In either the REC/PLAY or REC/PAUSE mode, the REC signal is output and the amplifier is set to the recording mode. Other functions are the same as in the PLAY/PAUSE mode.

4.4 FF mode

When the FF button is pressed, FF and FAST signals are output from Pin 27 and Pin 26 of the microcomputer, respectively.

The FF signal has the following functions:

a. Q549 is switched ON via R579. The slack tape removal circuit stops operating when Q549 is ON.

b. The reel motor drive circuit is activated via R570.

The FAST signal has the following functions:

c. Q515 is switched ON via Q573 and R558 to disable the PLAY signal circuit.

d. Q510 is switched ON VIA R531 to disable the REC signal circuit.

e. Q534 is switched ON momentarily via R559, C516 and Q576 to operate the solenoid drive voltage selector circuit.

f. Q523 and Q527 are switched ON via R559, Q571 and R596 to operate BRAKE solenoid L002.

4.5 REW mode

When the REW button is pressed, the REW signal and FAST signal are output from Pin 28 and Pin 26 of the microcomputer, respectively. The functions of these signals are practically the same as in the FF mode.

4.6 STOP mode

In any of the following cases, the deck is set to the STOP mode during any mode other than the program mode.

a. When the STOP button is pressed.

b. When the SENSOR STOP switch is pressed.

c. When the tape reaches its end.

d. When PROGRAM MODE switch S506 is set from the SINGLE position to the OFF/CA position.

e. When the COUNTER MEMORY switch S504 is set from the PLAY/STOP position to the OFF position with the PROGRAM MODE switch in the OFF/CA position.

During the program mode operation, the SENSOR STOP switch does not function. When unloading the cassette, the program mode operation is stopped and the tape deck is set to the STOP mode. The program mode operation stops by the procedures given in the above items d ane e.

4.7 Mode transfer

When the mode of operation is transferred from A to B, the signal in Q701 goes off and then the B signal is output on about 25 to 30 msec later. The tape deck is in the STOP mode until the B signal is output.

When the mode of operation is changed, the tape stops once and then starts again.

4.8 Functions of operation buttons

When more than one operation button are pressed, the priority of the mode is determined by the microcomputer. Except when the PLAY and PAUSE buttons are pressed, the tape mode is determined by the button which is released last. The relationship between the operation buttons and the modes of operation is as follows:

a. STOP button and any one of REW, FF, PLAY, PAUSE and REC buttons . . . STOP mode.

b. REW button and FF button . . . STOP mode.

c. REW (or FF) button and any one of PLAY, PAUSE and REC buttons . . . REW (or FF) mode.

d. PLAY button and PAUSE button

(1) When the PLAY button is pressed first . . . PLAY mode (or the mode of the button released last).

(2) When the PAUSE button is pressed first . . . STOP mode (STOP mode when the PLAY button is released first, and PLAY mode when the PAUSE button is released first).

5. Programming

Fig. 2.4 shows the program signal input circuit. The switches in the matrix circuit, program memory and control signal output are controlled by the microcomputer.

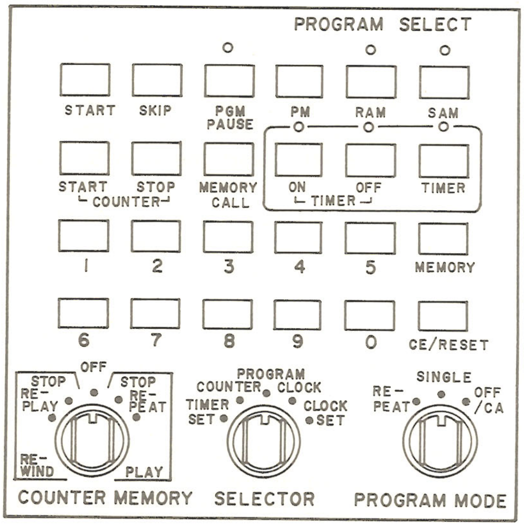
This section explains the operating conditions of the program setting switches and related functions.

The program setting switches have various functions, so special care should be taken when checking for circuit trouble or misoperation.

5.1 Matrix keys

Here, the functions of the program setting matrix keys are explained. For the functions of the 3 switches (COUNTER MEMORY, SELECTOR, PROGRAM MODE) at the lower part of the program setting unit, refer to Section 5-2 and succeeding sections.

Fig. 5-1 Program setting unit


PROGRAM SELECT
START
SKIP
PGM PAUSE
PM
RAM
SAM
START
STOP
COUNTER
MEMORY CALL
ON
OFF
TIMER
TIMER
1
2
3
4
5
MEMORY
6
7
8
9
0
CE/RESET
OFF
STOP RE-PLAY
STOP RE-PEAT
RE-WIND
PLAY
PROGRAM COUNTER
CLOCK
TIMER SET
CLOCK SET
SINGLE
RE-PEAT
OFF/CA
COUNTER MEMORY
SELECTOR
PROGRAM MODE

(1) START

This is a program mode start command key.

When the PROGRAM MODE switch is in the SINGLE or REPEAT position and the COUNTER MEMORY switch is in the PLAY/STOP or PLAY/REPEAT position, press the START key and the deck is set to the REW mode regardless of the position of the SELECTOR switch and the information stored in the memory.

(2) SKIP

This key is used to shift from one program to another during program mode operation.

When the PROGRAM MODE switch is in the SINGLE position and the last designated program is being played back, pressing the SKIP key causes the tape deck to enter the STOP mode.

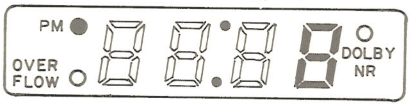
(3) PRG PAUSE

This is the PROGRAM PAUSE key. Press this key during the program mode operation and the tape stops briefly. To resume tape playback, press the same key again.

(4) PM

This key is used to indicate the PM (afternoon) sign on the display. It functions only when the SELECTOR switch is in the CLOCK SET position. By pressing the PM key, the display indicates as shown in Fig. 5.2.

Fig. 5-2 Indication when PM key is pressed


PM
OVER FLOW
DOLBY NR

(5) RAM, SAM

These are RANDOM ACCESS MEMORY key and SEQUENTIAL ACCESS MEMORY key, and are used for memorizing, executing and reading programs.

When the RAM key is used, the programs are executed in the order in which they are arranged. When the SAM key is used, the programs are executed in numerical order. If the programs are arranged in the order of 4, 5, 3, 2 and 1, they are executed (readout) by the memory as shown in Table below.

Read-in		Read-out, Execution	
Mode	Sequence	Mode	Sequence
RAM	4 – 5 – 3 – 2 – 1	RAM	4 – 5 – 3 – 2 – 1
		SAM	1 – 2 – 3 – 4 – 5
SAM	4 – 5 – 3 – 2 – 1	RAM	4 – 5 – 3 – 2 – 1
		SAM	1 – 2 – 3 – 4 – 5

The LEDs on the RAM and SAM keys indicate the memory being executed. They will light with the PROGRAM MODE switch in the SINGLE or REPEAT position.

(6) COUNTER/START, STOP

This is used to set the start and stop positions for counter, memory and play operations (STOP, REPEAT).

(7) MEMORY CALL

This is used to check the information stored in memory. It has no effect on the programs being executed and tape deck operation. To cancel memory call, press the MEMORY key. When the CE/RESET key is pressed while the memory is recalled by pressing the MEMORY CALL key, the information in the memory is reset and cleared.

a. Recalling the programs

The preset programs can be recalled when the SELECTOR switch is in the PROGRAM position and the PROGRAM MODE switch is in the SINGLE or REPEAT position. For example, if programs are preset in the RAM in the order of 4, 5, 3, 2 and 1 and the MEMORY CALL key is pressed, the memory is recalled and the display is as shown in the Table below. In this example, the indication is clear from the 6th position, indicating that all the programs have been executed. If no programs are stored in the memory, the indication goes off when the MEMORY CALL key is pressed.

Table 5-2 Program call and indication (example)

Memory call pressed	1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Indication	04	05	03	02	01	Cleared	04	05	03

b. Recalling the counter memory

The information in the counter memory is recalled with PROGRAM MODE . . . OFF/CA, SELECTOR . . . COUNTER, COUNTER MEMORY . . . PLAY/STOP or PLAY/REPEAT.

The start count and stop count informations are recalled and displayed alternately each time the MEMORY CALL key is pressed. When no information is stored in the memory, the display is "000".

c. Recalling the timer settings

The timer-on time and timer-off time are recalled and indicated alternately each time the MEMORY CALL key is pressed while the SELECTOR switch is in the TIMER SET position. The LEDs in the TIMER/ON and TIMER/OFF keys will light alternately to indicate which memory is recalled. If the POWER switch is OFF and the timer start is in the standby mode, the memory recall function is not done. If the TIMER switch (S503) position is changed when recalling timer-on or timer-off timer memory, the memory recall is reset and the actual time is indicated.

(8) TIMER/ON, OFF, TIMER

These 3 keys are used to set the timer.

a. TIMER/ON

Press this key when setting the timer start time. The start time can be set only when the SELECTOR switch is in the TIMER SET position. When the time is set, the LED above the key will light.

b. TIMER/OFF

Press this key when setting the timer stop time. The stop time can be set only when the SELECTOR switch is in the TIMER SET position. When the time is set, the LED above the key will light.

c. TIMER

This key is used to start and stop the timer. Press the key and the LED above the key will light to indicate that the timer is started. If the TIMER/ON or TIMER/OFF key or both are set, the LED above each key will light. When the TIMER key is pressed again, the LED goes off and the execution command is cleared.

If the TIMER/ON or TIMER/OFF key is not set, the LED will not light when the TIMER key is pressed and the timer will not operate.

When either the TIMER/ON or TIMER/OFF key is set, the timer starts operating when the TIMER key pressed regardless of the positions of the COUNTER MEMORY, selector and PROGRAM MODE switches, thus executing the timer operation. (Timer recording is not performed unless the COUNTER MEMORY is OFF and the PROGRAM MODE is OFF/CA.)

(9) 1—0

These keys are used to set program number, timer and count signals.

a. For example the figures "4, 3, 2, 1" can be set by pressing the keys 4, 3, 2 and 1 in that order.

To set figures "5:30", press the keys 5, 3 and 0 in that order.

b. In setting the count or timer, a maximum of 4 figures can be keyed in. In setting the program number, a maximum of 2 figures. Excess key-in is refused by the microcomputer.

c. If two or more keys are pressed, only the figure designated by the key first pressed is input. No signals are input by other keys while one key is depressed. When the signal is input, the count, time and sequence are indicated in the display. When the figures indicated are stored in the memory of the microcomputer by pressing the MEMORY key, the setting is completed.

(10) MEMORY

This key is used to store the figures preset in the display in the memory of the microcomputer. It is also used to reset in the memory recall operation.

NOTE: All the figures preset in the display may not be stored in the memory because of "error" or "overflow" (refer to section 5-3 "CLOCK SET, PROGRAM").

(11) CE/RESET

This is the CLEAR ENTRY/RESET key. It is used to clear, indicate and reset the information stored in the memory. For details, refer to section 5-2 and subsequent sections.

5.2 PROGRAM MODE Switch (S506)

(1) OFF/CA

CA represents CLEAR ALL. Use the OFF/CA position of the PROGRAM MODE switch referring to the section 5.3.

When the switch is set from SINGLE to OFF/CA (or from OFF/CA to SINGLE and to OFF/CA), the following functions are performed according to the conditions of the tape deck and the microcomputer.

a. The tape deck is set to the STOP mode.

b. Program mode operation is cancelled and the deck is set to the STOP mode. The programs are cleared from the memory.

c. The memory call is cleared and the following is indicated:

SELECTOR switch in PROGRAM position: 00
SELECTOR switch in COUNTER position: 0000
SELECTOR switch in TIMER SET position: Actual time

(2) SINGLE

In this position, the preset programs are played once.

(3) REPEAT

In this position, the preset program are played repeatedly.

5.3 SELECTOR Switch (S505)

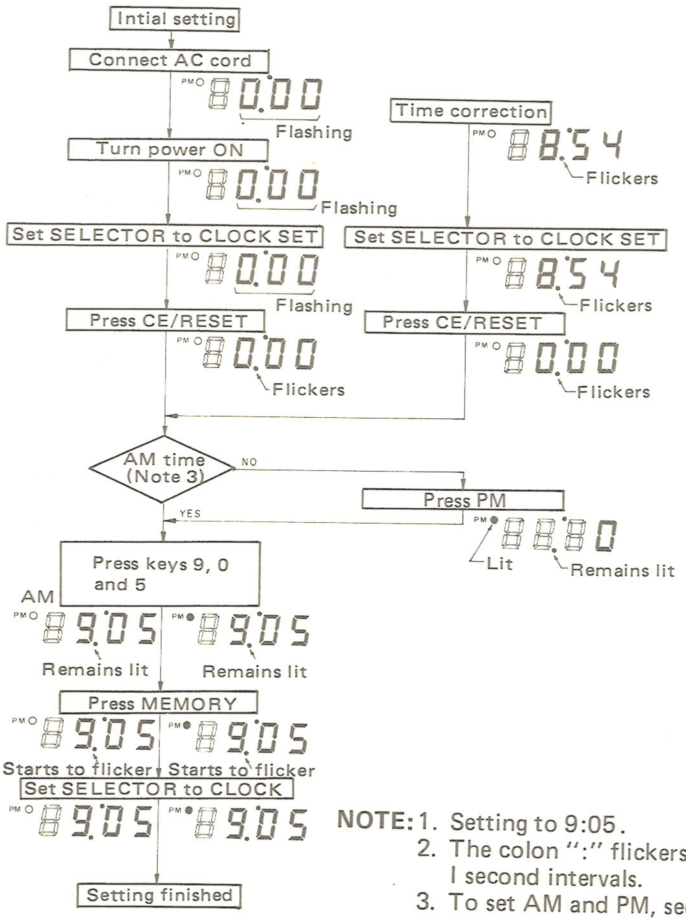
(1) CLOCK SET

When setting time, the switch should be placed in this position. Make sure that the POWER switch is ON. If it is OFF, the clock set input signal is not fed to the memory circuit of the microcomputer.

Time can be set regardless of the positions of the PROGRAM MODE and COUNTER MEMORY switches.

a. For setting the clock, follow the procedures shown in Fig. 5.3.

Fig. 5-3 Clock set flow chart


Intial setting
Connect AC cord
PM
8 0.0 0
Flashing
Turn power ON
8 0.0 0
Flashing
Set SELECTOR to CLOCK SET
8 0.0 0
Flashing
Press CE/RESET
8 0.0 0
Flickers
Time correction
8 8.5 4
Flickers
Set SELECTOR to CLOCK SET
8 8.5 4
Flickers
Press CE/RESET
8 0.0 0
Flickers
AM time (Note 3)
NO
YES
Press PM
8 8.8 0
Lit
Remains lit
Press keys 9, 0 and 5
AM
8 9.0 5
8 9.0 5
Remains lit
Remains lit
Press MEMORY
8 9.0 5
8 9.0 5
Starts to flicker
Starts to flicker
Set SELECTOR to CLOCK
8 9.0 5
8 9.0 5
Setting finished

NOTE: 1. Setting to 9:05.
2. The colon ":" flickers at I second intervals.
3. To set AM and PM, see item C, section 5-3.

b. In any of the following cases, an error signal is generated and the display flashes at about 0.3 second intervals when the MEMORY key is pressed.

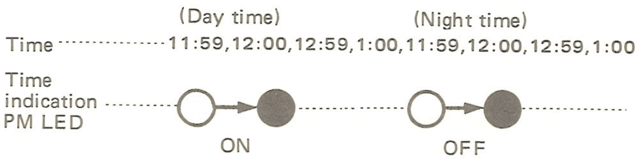
* Hours digits are not 1-12.

* Minutes digits are over 60.

If an error signal is given, press the CE/RESET key to reset the clock.

c. The clock indicates time 1:00 through 12:59. PM and AM signs are indicated by LEDs. The relationship between the time and PM LED is as follows:

Fig. 5-4 Time indication and PM LED


(Day time)
(Night time)
Time
11:59,12:00,12:59,1:00,11:59,12:00,12:59,1:00
Time indication
PM LED
ON
OFF

The clock does not indicate hours between 0:00 and 1:00 AM (or PM).

d. The time indicating reference signal is obtained by dividing the power frequency, so the frequency selector switch on the rear of the tape deck should be set to the correct power frequency.

At the completion of clock setting, be sure to set the SELECTOR switch to the CLOCK position to prevent the setting from being changed if any key is pressed by mistake.

(2) CLOCK

When the SELECTOR switch is in the CLOCK position, the digital display functions as a clock. With the POWER switch OFF, time is indicated regardless of the position of the SELECTOR switch.

When power is restored after a power failure, the clock is reset to "0:00" and the time indication flickers but the clock remains operating. If the indication "0:36" is flickering, it means that it is 34 minutes after a power failure.

(3) PROGRAM

3-1. Program Setting

a. Set the POWER switch to ON and the SELECTOR switch to PROGRAM.
The display indicates 00.

b. Set the PROGRAM MODE switch to SINGLE or REPEAT.

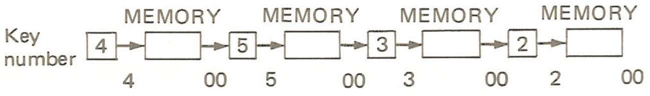
c. The COUNTER MEMORY switch may be set to any position, since it is independent of program operation.

d. Press the RAM or SAM key. The LED above the key will light.

RAM:	Memory call and playback operations are carried out in the order of program setting.
SAM:	Memory call and playback operations are carried out in the sequential order of the program number, regardless of the order of program setting.

e. Set the desired programs.
Store the desired program numbers in the memory in the desired playback order. For example, if programs 4, 5, 3 and 2 are to be played in that order, use the keys as follows:

Fig. 5-5 Programming sequence


Key number
4
MEMORY
5
MEMORY
3
MEMORY
2
MEMORY
4
00
5
00
3
00
2
00

f. A maximum of 18 programs can be preset. If 19 or more programs are preset and then the MEMORY key is pressed, an error signal is developed, causing the display to flicker at about 0.3 second intervals.

g. A maximum of 19 programs can be preset provided that the program number is less than 18. The same programs can be preset as many times as desired. Up to 19 programs can be stored in memory.
If the MEMORY key is pressed to store 20 programs, overflow occurs, causing the overflow LED to flicker. By pressing the CE/RESET key, it stops flickering and the display indicates 00.

h. To check the programs stored in memory, press the MEMORY CALL key. To stop the memory recall operation, press the MEMORY key. Note that the program indicated on the display is cleared if the CE/RESET key is pressed.

i. When changing the program arrangement, proceed as follows:

1) Change of all programs
   - * Set the PROGRAM MODE switch to OFF/CA and then set to SINGLE or REPEAT.
   - * Remove the cassette from the tape deck and reinsert it.

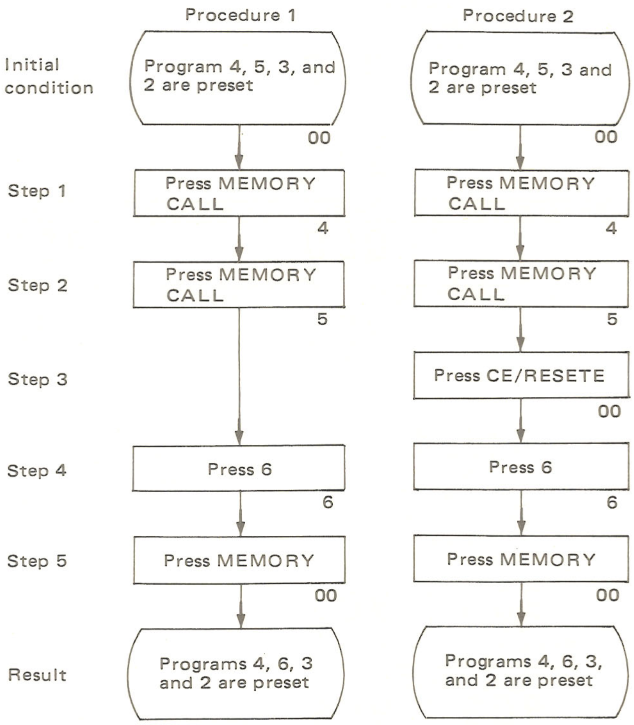
   In either case, all the programs are cleared, permitting new programs to be preset.

2) Addition of programs
   If any programs need to be added to the preset programs, press the MEMORY key to indicate 00 on the display, then follow the procedures noted in item "e".

3) Insertion of programs
   Insertion of any other programs in the preset programs (for example between 4, 5, 3 and 2) is not possible; for example, programs 6 and 7 cannot be inserted between programs 4 and 5.
   In this case, all the previous programs should be cleared.

4) Program replacement (1)
   To replace preset programs (for example, 4, 5, 3 and 2) with other programs (for example 4, 6, 3 and 2), there are two different methods as shown in Fig. 5.6. In either method, the result is the same but the operating conditions of the memory is different.
   In the procedure 1, when the program correction is stopped after steps 2 and 4, the information in the memory remains the same and program 4, 5, 3 and 2 are left in the memory.

Fig. 5-6 Program replacement method (1)


Procedure 1
Procedure 2
Initial condition
Program 4, 5, 3, and 2 are preset
Program 4, 5, 3 and 2 are preset
00
00
Step 1
Press MEMORY CALL
Press MEMORY CALL
4
4
Step 2
Press MEMORY CALL
Press MEMORY CALL
5
5
Step 3
Press CE/RESETE
00
Step 4
Press 6
Press 6
6
6
Step 5
Press MEMORY
Press MEMORY
00
00
Result
Programs 4, 6, 3 and 2 are preset
Programs 4, 6, 3, and 2 are preset

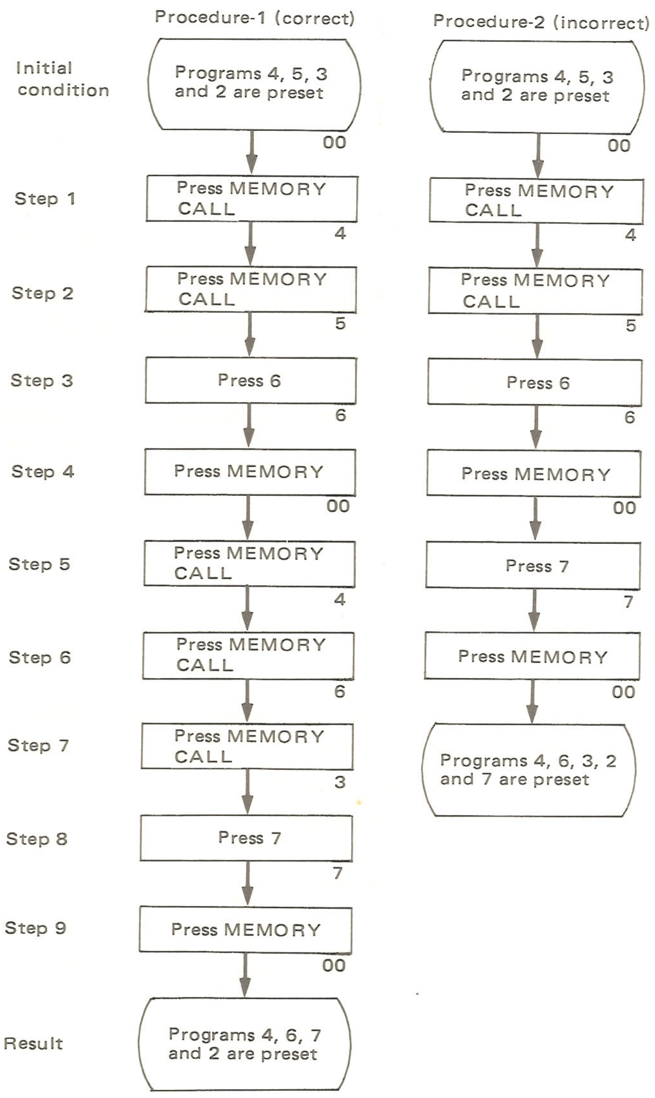
In the procedure 2, when step 3 is executed, the previous program 5 is cleared. So, if the program correction is stopped after steps 3 and 4, the programs 4, 3 and 2 are left and, therefore, program 6 cannot be inserted between programs 4 and 3.

5) Program replacement (2)

Here, the method of replacing programs 4, 5, 3 and 2 with programs 4, 6, 7 and 2 (In practice, it is advisable to clear all the previous programs) is explained. Refer to Fig. 5.7.

In procedure 2, suppose that program 5 has been preset by mistake. By pressing the MEMORY key, program 6 is preset in memory where program 5 was preset and, at the same time, memory recall is cancelled.

Fig. 5-7 Program replacement method (2)


Procedure-1 (correct)
Procedure-2 (incorrect)
Initial condition
Programs 4, 5, 3 and 2 are preset
00
Step 1
Press MEMORY CALL
4
Step 2
Press MEMORY CALL
5
Step 3
Press 6
6
Step 4
Press MEMORY
00
Step 5
Press MEMORY CALL
4
Press 7
7
Step 6
Press MEMORY CALL
6
Press MEMORY
00
Step 7
Press MEMORY CALL
3
Programs 4, 6, 3, 2 and 7 are preset
Step 8
Press 7
7
Step 9
Press MEMORY
00
Result
Programs 4, 6, 7 and 2 are preset

After program 6 has been preset, memory is set in the standby mode at the position next to the last program (the blank space next to program 2).

Therefore, if program 7 is preset after program 6, the programs preset are 4, 6, 3, 2 and 7.

When program 7 is preset according to procedure 2, the result is the same as in the case of the addition of programs.

j. Once the programming has been completed, the programs remain in storage regardless of the position of the SELECTOR switch.

3-2. Program Execution

a. Programs are executed in playback only.

b. Set the PROGRAM MODE switch to the SINGLE or REPEAT position.

SINGLE: The tape stops after all the preset programs are played.

REPEAT: The preset programs are played repeatedly.

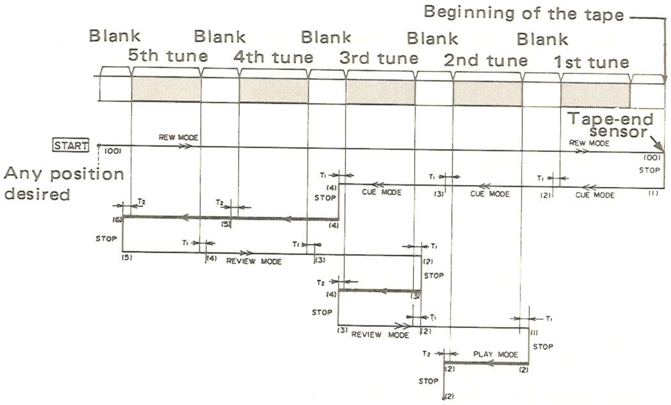
c. Select either RAM or SAM.

RAM: Programs are played in the order in which they are preset.

SAM: Programs are played in numerical order. When the same program is preset twice or more, it is played as many times as it is preset.

d. By pressing the START key, the tape is rewound to the beginning to detect the tape end. This is necessary to determine the starting position of the tape. When the tape reaches the beginning, the tape deck stops once and then plays the programs. Fig. 5.8 shows the operation of the tape deck when programs 4, 5, 3 and 2 are preset (the PROGRAM MODE switch is set to SINGLE and the MEMORY switch set to RAM).

Fig. 5-8 To excute the programmed function


Beginning of the tape
Blank
Blank
Blank
Blank
Blank
5th tune
4th tune
3rd tune
2nd tune
1st tune
Tape-end sensor
START
REW MODE
(00)
STOP
Any position desired
T₁
T₂
CUE MODE
REVIEW MODE
PLAY MODE
(1)
(2)
(3)
(4)
(5)
(6)

NOTE:

1. Programs 4, 5, 3 and 2 are preset (RAM, SINGLE).
2. Program detection time (about 2.5 sec) at T1 = PLAY mode.
3. Program detection time (about 30–40 mSec) in CUE/REVIEW mode.
4. The figures in ( ) show program numbers.

When the first program is 1, the tape deck is set to the PLAY mode. When it is not 1, the tape deck is set to the CUE mode.

The program detector circuit detects the end of each program and the program number is counted. When the tape reaches program 4, the tape deck stops and then starts playing the program. At the end of program 4, the blank space between the programs is detected and the program number is counted up one step to play program 5. At the end of program 5, the tape is rewound to program 3. The tape deck stops and then plays program 3. The display indicates 3.

At the end of program 3, the tape is rewound again to play program 2. At the end of program 2, the tape deck stops and the display indicates the last program number.

e. To ensure stable program operation, the sensitivity and response of the program detection circuit and the tape speed in the CUE/REVIEW mode should be stabilized (refer to section 3.8).

f. During playback, the display indicates the number of the program being played.

g. To stop any program being played to play the next program, press the SKIP key. The tape advances to the beginning of the next program and this program is played.

h. To stop the tape temporarily during playback, press the PMG PAUSE key. To resume playback, press the same key again.

i. During the execution of the programs, the REW, STOP, FF, PLAY and REC keys will not function. The SENSOR STOP switch is also inoperative.

j. To stop the program operation, set the PROGRAM MODE switch to the OFF/CA position.

k. Once the programs are stored in memory, they can be played by pressing the START key regardless of the positions of the COUNTER MEMORY switch and SELECTOR switch. At this time, the PROGRAM MODE switch should be in the SINGLE or REPEAT position.

l. By using the timer, the programs can be played at any desired time. For details, refer to section 5.5.

(4) COUNTER

The digital indicator functions as a tape counter when the SELECTOR switch is in the COUNTER position.
The counter signal is fed from photocoupler Q001 interlocked with the right reel disk to drive the up/down counter in the microcomputer.
The counter keeps operating as long as the tape is running.
With the switch in the COUNTER position, the start/stop count of the counter memory play also functions.

1. Tape counter:
   a. The tape counter indicates 0000 through 9999.
   b. In the PLAY FF or CUE mode, the count is increased. In the REW or REVIEW mode, the count is decreased.
   c. The counter increases/decreases by two for every rotation of the right reel disc.

2. Counter reset:
   a. Pressing the CE/RESET key, the counter is reset to 0000.
   b. The counter is reset when CE/RESET key is pressed. If it is reset while the tape is moving, the counter is reset to 0000 and then starts counting even if the CE/RESET key is kept depressed.
   c. The counter will not be reset until the power of the tape deck is switched OFF unless the CE/RESET key is pressed.

3. Setting of start/stop count:
   For the functions of the counter memory play, refer to section 5.3.
   a. Set the SELECTOR switch to the COUNTER position.
   b. Set the PROGRAM MODE switch to the OFF/CA position.
   c. Set the COUNTER MEMORY switch to the PLAY/STOP or PLAY/REPEAT position.
   d. Set the counter to the desired starting point. To start it from 100, press the following keys: COUNTER/START, 1, 0, 0, MEMORY.
   e. Set the counter to the desired stopping point. To stop it at 300, press the following keys: COUNTER/STOP, 3, 0, 0, MEMORY.
   f. The counter can be set in the above way even if the procedures in times d and e are reversed.
   g. By pressing the MEMORY CALL key, the preset count can be indicated. Pressing the key once (or an odd number of times), the start count is indicated. Pressing twice (or an even number of times), the stop count indicated.
   h. To change the preset count, recall the count to be changed by pressing the MEMORY CALL key, then input a new count. Then press the MEMORY key.
   i. The start/stop count preset is reset when the COUNTER MEMORY is set to the OFF position or the cassette is removed.
   j. The start/stop counter can be used in combination with the timer. For details, refer to section 5.5.

(5) TIMER SET

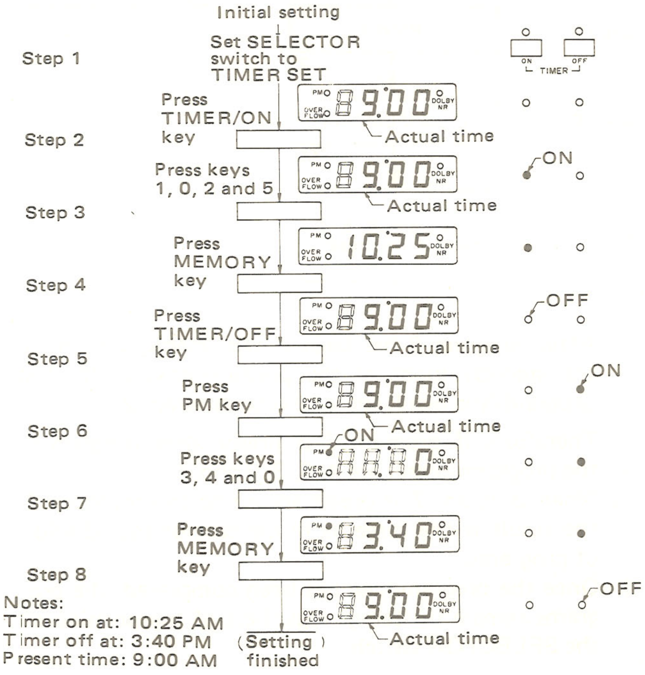
The tape deck can be started and stopped at any desired time by using the clock built into the tape deck. Set the SELECTOR switch to the TIMER SET position to set the start and stop time. For the timer play and recording operations, refer to section 5.5.
To set the time, proceed as follows:

a. Set the SELECTOR switch to the TIMER SET position. The time is set regardless of the positions of other switches.

b. When setting the time, refer to Fig. 5.9.

   Even when steps 5.8 are executed between steps 1 and 2, the result is the same.

Fig. 5-9 Timer-setting procedure



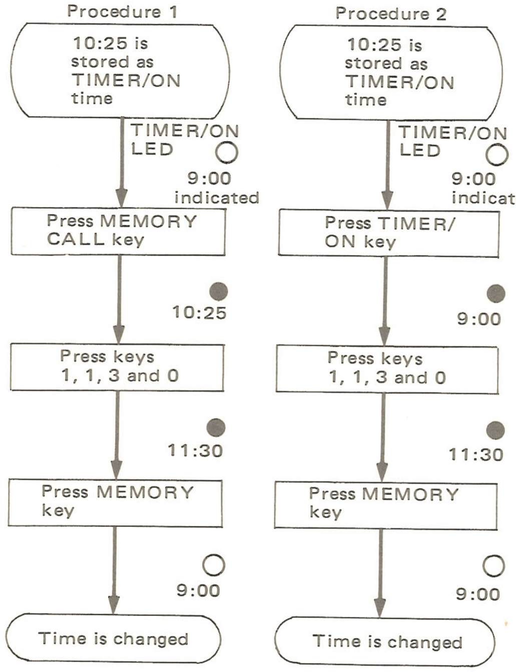
Notes:
Timer on at: 10:25 AM
Timer off at: 3:40 PM
Present time: 9:00 AM

c. For setting AM or PM, refer to section 5.3(1) C and Fig. 5.4.

d. To check the set time, press the MEMORY CALL key. The time is indicated in the digital display. TIMER/ON or TIMER/OFF can be seen from the LEDs above the keys.
When the TIMER switch (S503) is set to another position, the memory recall is reset and the actual time is indicated.

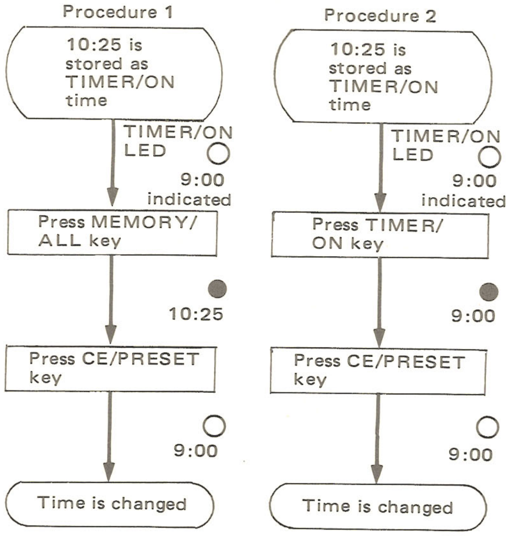
Fig. 5-10 Timer-setting change procedure

* TIMER/ON time 10:25 is changed to 11:30.
* Actual time is 9:00.


Procedure 1
10:25 is stored as TIMER/ON time
TIMER/ON LED
9:00 indicated
Press MEMORY CALL key
10:25
Press keys 1, 1, 3 and 0
11:30
Press MEMORY key
9:00
Time is changed
Procedure 2
10:25 is stored as TIMER/ON time
TIMER/ON LED
9:00 indicated
Press TIMER/ON key
9:00
Press keys 1, 1, 3 and 0
11:30
Press MEMORY key
9:00
Time is changed

e. To change the set time, refer to Fig. 5.10.

Fig. 5-11 Timer-setting clear procedure


Procedure 1
10:25 is stored as TIMER/ON time
TIMER/ON LED
9:00 indicated
Press MEMORY/ALL key
10:25
Press CE/PRESET key
9:00
Time is changed
Procedure 2
10:25 is stored as TIMER/ON time
TIMER/ON LED
9:00 indicated
Press TIMER/ON key
9:00
Press CE/PRESET key
9:00
Time is changed

* TIMER/ON time 10:25 is cleared.
* Actual time is 9:00

f. To clear the set time, refer to Fig. 5.11.
Unless the set time is cleared, it is retained until the power supply of the tape deck is turned off.

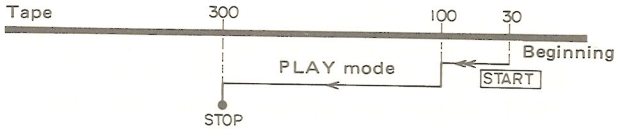
5.4 COUNTER MEMORY Switch (S504)

(1) PLAY/STOP

With the COUNTER MEMORY switch in the PLAY/STOP position and the PROGRAM MODE switch in the OFF/CA position, press the START key.
The tape will be played from the position set by the counter/start switch and stops under the control of the same switch.
When the start count is set to 100 and the stop count is set to 300, the tape deck functions as follows (the SELECTOR switch has no effect on tape playback as long as the start/stop count is stored):

a. Tape count is below 100 (example: 30):
 * By pressing the START key, the deck is set to the FF mode.
 When the tape count reaches 100, the tape stops and then starts playing. When the tape count reaches 300, the deck is set to the STOP mode (Fig. 5.12).

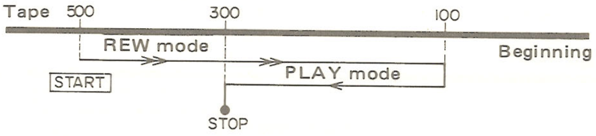
Fig. 5.12 Count is below start count


Tape
300
100
30
Beginning
PLAY mode
START
STOP

* During playback, if the tape reaches its end before the counter indicates 300, the tape stops at that point.

b. Tape count is above 100 (example: 500):
 * By pressing the START key, the deck is set to the REW mode and wound back to 100. At this point, the tape stops and then starts playing.
 The tape stops at 300 (Fig. 5.13).

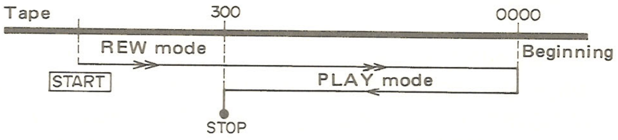
Fig. 5.13 Count is above start count


Tape
500
300
100
REW mode
Beginning
PLAY mode
START
STOP

* During the REW mode, if the tape reaches its end before the counter indicates 100, the tape stops at that point.

c. Start point is not set (0000):
 * By pressing the START key, the deck is set to the REW mode.
 When the count reaches 0000, the tape stops and then starts playing. The tape stops at 300 (Fig. 5.14).

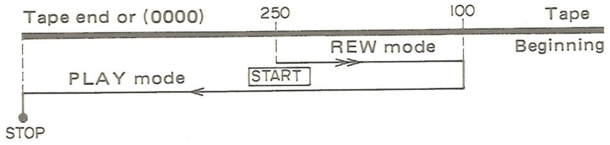
Fig. 5.14 Start count is not set


Tape
300
0000
REW mode
Beginning
START
PLAY mode
STOP

When the tape reaches its end before the counter indicates 0000, the tape stops at that point.

d. Stop point is not set:
 - * By pressing the START key, the tape begins play from 100 as in the above items "a" and "b". The tape is played to the end and then stops (If the start count is set to a large figure such as 9900, the tape stops when the counter reaches 0000 after 9999). Refer to Fig. 5.15.

Fig. 5.15 Stop count is not set



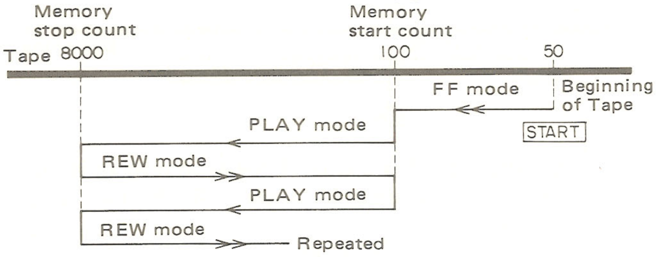
e. During counter-controlled operation, the operating buttons will not function. To stop the tape temporarily during playback, press the PMG PAUSE key. To resume playback, press the same key once again.

f. To stop the tape deck after releasing counter-controlled operation, set the COUNTER MEMORY switch to the OFF position.

g. During counter-controlled operation, if the PROGRAM MODE switch is set to the SINGLE or REPEAT position, and tape will be rewound. The tape stops at the end of the tape. When the switch is set to the OFF/CA position during the REW mode, the tape stops at that point (the memory is retained).

(2) PLAY/REPEAT
In this position, the tape plays repeatedly between the start count and stop count (Fig. 5.16).
To release the PLAY/REPEAT mode, set the COUNTER MEMORY switch to the OFF position.

Fig. 5.16 PLAY/REPEAT Operation by COUNTER MEMORY



(3) OFF
In this position, playback under control of the counter memory is released and, at the same time, the start and stop counts stored in the memory are cleared.
When the COUNTER MEMORY switch is in the OFF position, timer recording is not possible. Refer to section 5.5.

(4) REWIND/STOP
When the COUNTER MEMORY switch is in the REWIND/STOP position and the PROGRAM MODE switch is in the OFF/CA position, the tape deck functions as follows:

a. By pressing the REW key, the tape is rewound to a counter reading of 0000.

b. When the tape reaches its end during the REW mode before the counter indicates 0000, the tape stops at that point.

c. During the REW mode, the tape also stops in the following cases:
 1) The STOP button is pressed.
 2) The SENSOR STOP button is pressed.
 3) The PROGRAM MODE switch is set from OFF/CA to SINGLE and to OFF/CA.
 4) The CE/RESET key is pressed when the SELECTOR switch is in the COUNTER position.
 5) The COUNTER MEMORY switch is set to the PLAY (STOP, REPEAT) position and then to the OFF position.

(5) REWIND/REPLAY
The basic functions of the tape deck are the same as in the item (4) REWIND/STOP. In the case of items "a" and "C-4", the tape stops once and then begins to play. The tape stops at the end of the tape.

5.5 TIMER Switch

The TIMER switch is used to control the operation of the tape deck at the designated time. By using the timer in combination with the PROGRAM MODE switch and COUNTER MEMORY switch, the tape can be set in the program operation or counter memory play operation. For use of these switches, refer to the item (5) and subsequent items. The timer on/off function also allows control of AC power supplied to external devices connected to SD8000.

Refer to item (5) and subsequent items for the power supply control.

The following items (1) through (5) are related to the timer cycle (OFF-ON-OFF) that starts and stops the tape deck at designated times. Unless otherwise specified, the PROGRAM MODE switch should be in the OFF/CA position and the COUNTER MEMORY switch in the OFF position.

(1) REC

When all the following conditions are met, the TIMER/REC LED on the switch is lit to indicate that the deck is ready for timer recording.

* A cassette with erasure prevention tab is loaded.
* The PROGRAM MODE switch is in the OFF/CA position.
* The COUNTER MEMORY switch is in the OFF position.
* The TIMER switch is in the REC position.
* The TIMER key is pressed to operate the timer (LED above the TIMER key is ON).

Check that the TIMER/RED is ON. The tape is set to the REC/PLAY mode at the timer-on time and stops at the timer-off time.

If the cassette has no erasure prevention tabs, the tape is set to the PLAY mode at the timer-on time (In the REC position, the tape is also set to the PLAY mode even when the tape deck is in COUNTER MEMORY operation or PROGRAM operation).

(2) OFF

In this position, the power supply of the external devices can be controlled by using the timer built into the SD8000. The tape deck is in the STOP mode in this position, but it can be operated if desired.

(3) PLAY

The tape is set to the PLAY mode at the timer-on time and stops at the timer-off time.

(4) CIRCUIT OPERATION

Refer to Fig. 5.17.

Fig. 5.17 Timer Curcuit

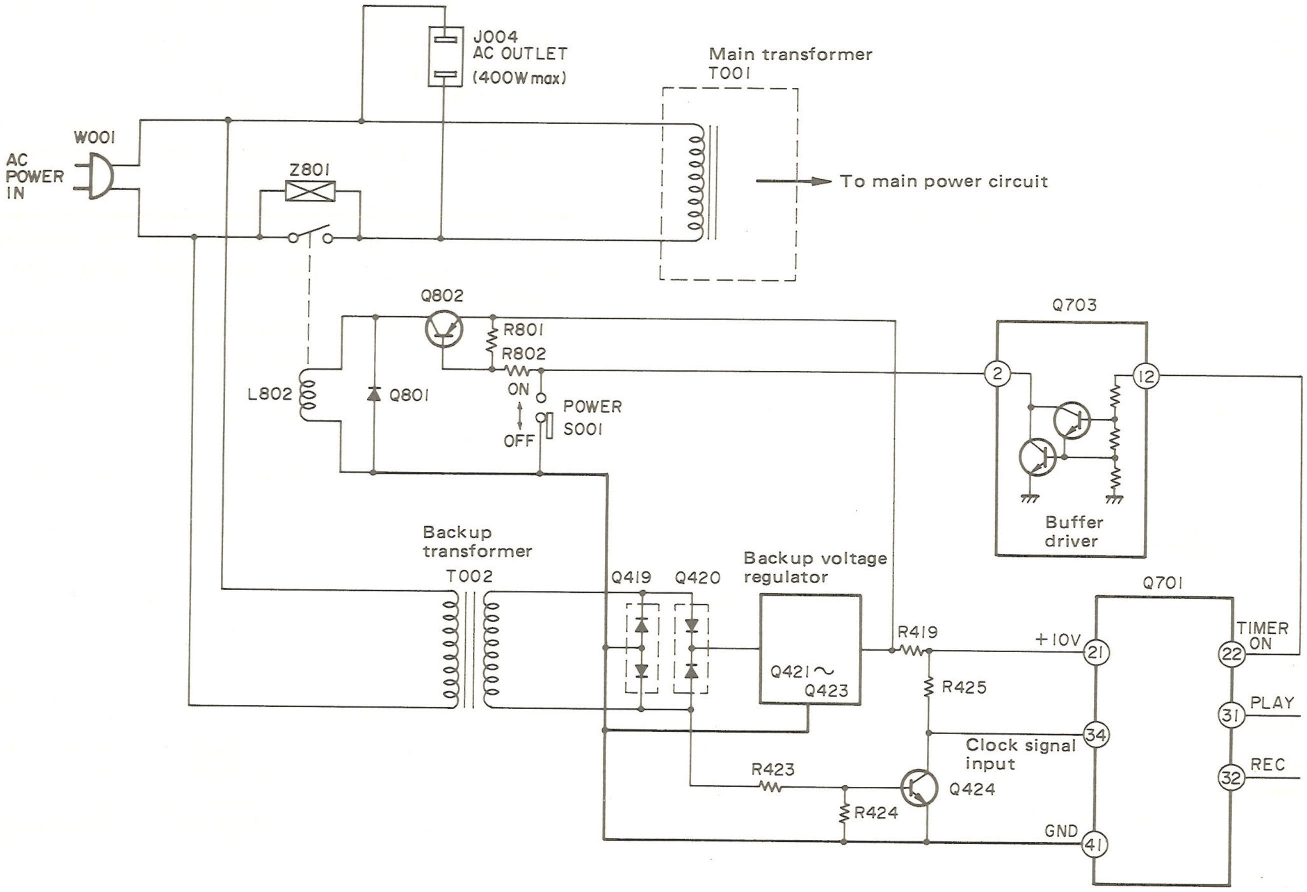

J004
AC OUTLET
(400W max)
Main transformer
T001
W001
AC POWER IN
Z801
To main power circuit
Q802
R801
R802
L802
Q801
ON
POWER
S001
OFF
Q703
2
12
Buffer driver
Backup transformer
T002
Q419
Q420
Backup voltage regulator
Q421 ~ Q423
R419
+10V
R425
R423
R424
Q424
Clock signal input
GND
Q701
21
22
TIMER ON
31
PLAY
32
REC
34
41

Fig. 5.18 TIMER/REC

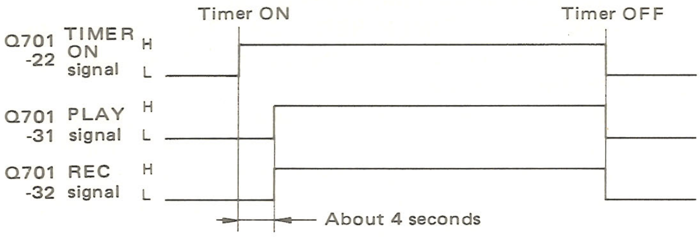

Timer ON
Timer OFF
Q701 -22 TIMER ON signal
Q701 -31 PLAY signal
Q701 -32 REC signal
H
L
About 4 seconds

Fig. 5.19 TIMER/OFF

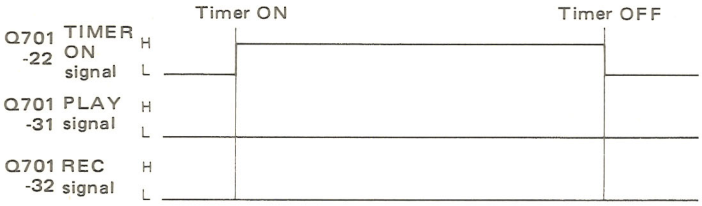
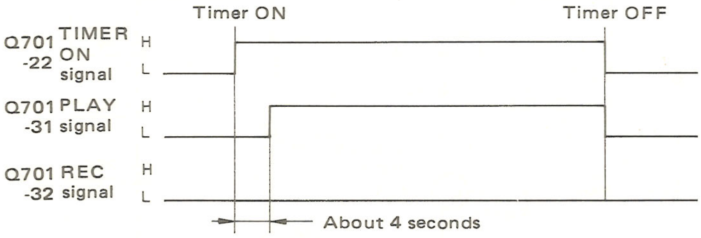

Timer ON
Timer OFF
Q701 -22 TIMER ON signal
Q701 -31 PLAY signal
Q701 -32 REC signal
H
L

Fig. 5.20 TIMER/PLAY


Timer ON
Timer OFF
Q701 -22 TIMER ON signal
Q701 -31 PLAY signal
Q701 -32 REC signal
H
L
About 4 seconds

a. Fig. 5.18 through Fig. 5.20 shows the output of the microcomputer Q701 at the timer-on and -off times.

b. At the timer-on time, the TIMER ON signal level becomes high and then the PLAY signal level about 4 seconds later.

c. When the POWER switch is OFF, the TIMER ON signal drives Q802 and relay L802 via Q703 and R802.

d. When the contacts of L802 are closed, the AC power is supplied to main transformer T001 and AC outlet J004.

e. AC power is supplied to the external devices through the AC outlet rated at a max. load of 400W.

f. The AC power is supplied to the main power circuit through the main transformer. This circuit is used to drive the capstan motor, solenoids and amplifier. When L802 is activated, the capstan motor starts running and the amplifier is set to the stand-by mode. The motor speed and the voltages at all points are stabilized after about 4 seconds, then the PLAY signal (and REC signal) are output from the microcomputer so that the tape deck is set to the PLAY mode (or REC/PLAY mode).

g. At the timer-off time, the levels of the TIMER ON and PLAY signals become low and the tape deck stops. With the TIMER ON signal at low level, Q802 and L802 are turned off and the AC power to the external devices (AC outlet) is turned off.

h. When the TIMER switch is in the OFF position, only the TIMER ON signal is output.

i. When the POWER switch is ON, the AC power is supplied to the main power circuit and the external devices (AC outlet).

Here, the operating modes of the tape deck using the timer and the operating conditions are explained. The terms and conditions used in the explanation are as follows:

Timer ON stand-by . . .	Tape deck in any operating condition including STOP is in the stand-by mode until the timer is ON.
Timer OFF stand-by . .	Tape deck in any operating condition including STOP is in the stand-by mode until the timer is OFF.

	Counter Memory	Program Mode	Remarks
Condition 1	OFF	OFF/CA	
Condition 2	PLAY/STOP or PLAY/REPEAT	OFF/CA	Stop/start counts are stored.
Condition 3	OFF	SINGLE or REPEAT	Programs are stored.
Condition 4	PLAY/STOP or PLAY/REPEAT	SINGLE or REPEAT	Count and program are stored.

(5) Timer cycle OFF-ON

The tape deck starts operating at the time preset in the timer. This feature is used when using the deck as an alarm or for unattended tape recording.
(In this case, the timer-off time should be cleared. When the memory is cleared, the display indicates 0:00. The timer-off function does not function at 0:00).

a. When the POWER switch is OFF during timer ON stand-by: At the timer ON time, the power supply of the tape deck is turned on. The external devices are also supplied with AC power.
b. When the POWER switch is ON during timer ON standby:
AC power is supplied to the tape deck and the external devices.
c. When the TIMER switch is in the REC position:
At timer ON, the tape deck functions as follows (the parentheses indicate operation when the erasure prevention tabs have been removed from the cassette).

Condition 1:	REC/PLAY (PLAY)
Condition 2:	PLAY (Counter memory and program are not possible.)
Condition 3:	PLAY (PLAY Operations are not possible.)
Condition 4:	PLAY (PLAY) "

d. When the TIMER switch is in the OFF position: The power is controlled by the TIMER ON signal.
e. When the TIMER switch is in the PLAY position: At timer ON, the tape deck functions as follows.

Condition 1:	PLAY
Condition 2:	Counter memory play operation
Condition 3:	Program play operation
Condition 4:	Program play operation

(6) Timer cycle ON-OFF

Set the tape deck to the PLAY or REC/PLAY mode. The tape deck stops at the preset time. This feature is also used for sleep timer operation.
At timer OFF, the tape deck stops. The tape deck also stops if the tape reaches its end before the timer OFF time. To turn off the AC power at the timer OFF time, proceed as follows:

a. Turn the POWER switch ON.
b. Store the timer OFF time, then press the TIMER key to start the timer.
c. Set the deck to the REC/PLAY mode.
d. At timer ON, the deck is set to the PLAY or REC/PLAY mode. Turn the POWER switch OFF.
e. At timer OFF, the tape stops and, at the same time, the AC power to the tape deck and the external devices is turned off.

(7) Timer cycle OFF-ON-OFF

At timer ON, the tape deck is set to the PLAY or REC/PLAY mode; at the timer OFF, the tape deck stops. This feature is also used when using the deck as an alarm or for unattended tape recording. In this case, the timer OFF function is added to the timer cycle OFF-ON in the above item (5). The tape deck stops when the tape reaches its end before the timer OFF time.
If the POWER switch is OFF, the power remains on until the timer OFF time is reached even when the tape stops automatically at the end of the tape.
Note that the timer OFF time should be set to a time later than the timer ON time.

(8) Timer cycle ON-OFF-ON

If the tape deck is in the PLAY or REC/PLAY mode, it will stop at the timer OFF time, and start again at the timer ON time. This feature is also used for sleep timer operation or when used as an alarm. The timer ON time should be set to a time later the timer OFF time. If it is not required to interlock the timer with the power supply, leave the POWER switch in the ON position with the tape deck started, then set the timer OFF and ON times so that the timer operation command is given by the TIMER key.
To interlock the timer with the power supply, use the following procedure:

a. Turn the POWER switch ON.
b. Store the timer ON and OFF times, then press the TIMER key.
c. Set the tape in the PLAY or REC/PLAY mode.
d. Turn the POWER switch OFF.

(9) Timer setting (special case)

When the hour display is other than 1 through 12, an error signal is generated as noted in section 5.3 "CLOCK SET".
However, the clock can be set to 0:00 only in the following cases.

* The power is connected to the tape deck and the CE/RESET key is pressed after the POWER switch is set to ON.
* At the CLOCK SET position of the SELECTOR switch, the CE/RESET key is pressed after the PM key has been pressed.

In either case, the clock starts operating when the CE/RESET key is pressed. Therefore, the timer ON and OFF times can be set using the time when the CE/RESET key is pressed as a reference. In this case, the setting time should be between 1:00 and 11:59, 12:00 PM and 11:59 PM, or 12:00 and 12:59.

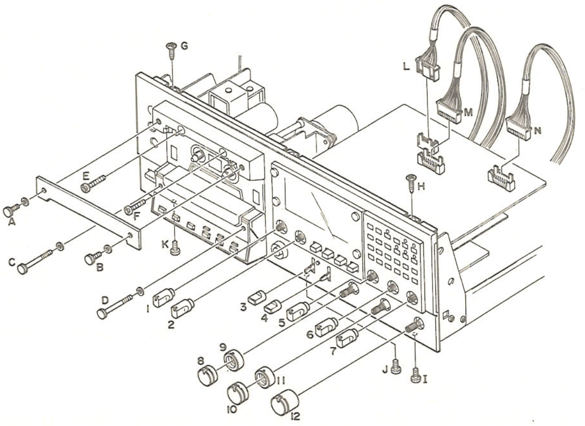
(10) Others

a. When the time on the clock coincides with the timer ON or OFF time during timer operation, the TIMER ON signal is switched momentarily from low level to high level, or vice versa. For example, if 9:05 is stored in memory and the time on the clock advances to 9:05, the TIMER ON signal is given momentarily. In this case, the TIMER ON signal remains the same even if 9:05 is stored in memory when the clock indicates 9:05.
b. When the tape deck is in the PLAY or REC/PLAY mode during timer operation, the operating mode remains unchanged even if the TIMER switch is set to another position.

4. DISASSEMBLE

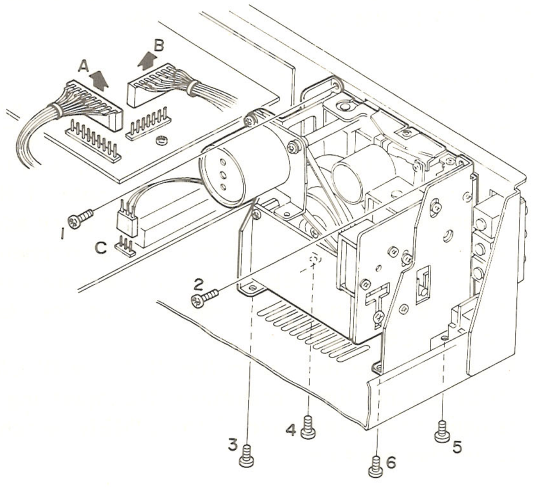
1. Removing the Front Panel

Remove the 12 knobs 1 ~ 11 and 12. Then, remove the 10 screws A, B, C, E, F, G, H, I, J and K.
Then, remove the two connector L, M , N.


G
L
M
N
E
H
F
A
K
C
B
D
1
2
3
4
5
6
7
8
9
10
11
12
J
I

2. Removing the Mechanism Chassis

1) Remove the mechanism operating section housing. (Refer to detaching the front panel.)
2) Remove the 6 mechanism mounting screws.
3) Remove connectors (A), (B) and (C).

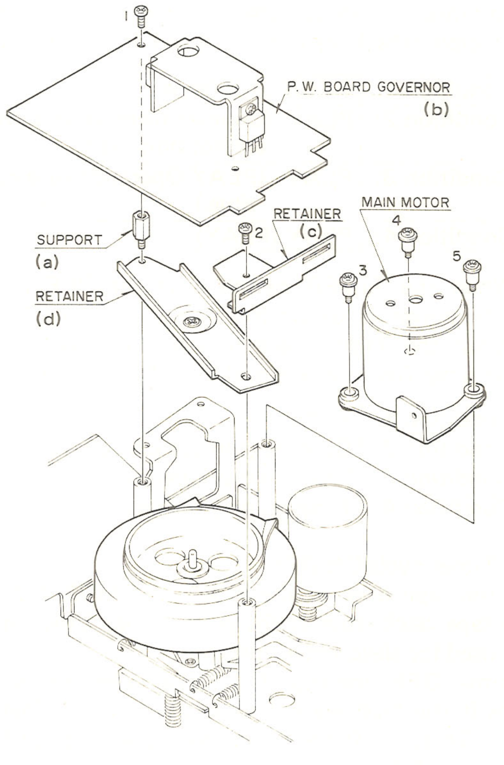


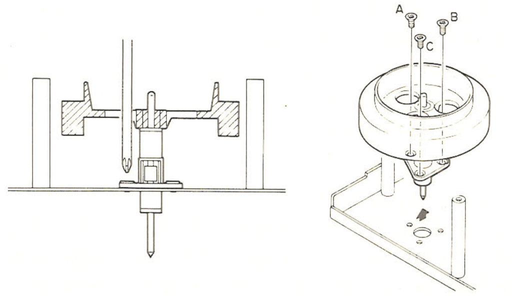
3. Detaching the Flywheel

1. Remove the single mounting screw (1) of the printed wiring board (b).
2. The printed wiring board can now be detached.
3. Remove the support (a) and the single attaching retainer (c) mounting screw (2).
4. The flywheel support retainer (d) can now be detached.
5. Remove the motor mounting bracket (3 screws).

NOTE: Take care to avoid oil getting on the motor belt.

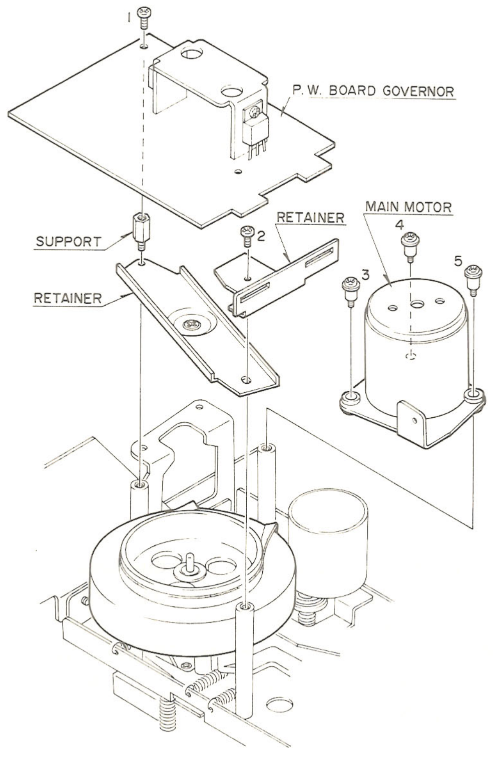
6. Insert a screwdriver through the 3 holes in the flywheel.
7. Remove the 3 spindle bearing mounting screws (A), (B), (C).
8. The flywheel can be detached.

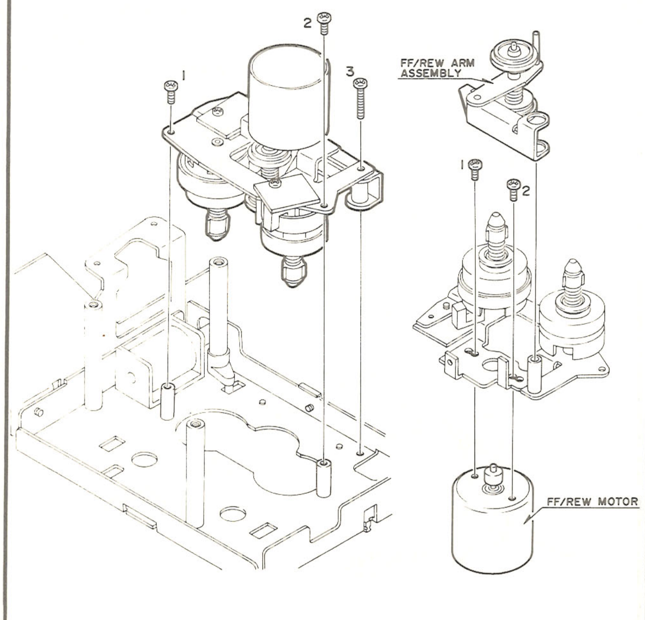

1
P. W. BOARD GOVERNOR
(b)
RETAINER
(c)
MAIN MOTOR
4
2
SUPPORT
(a)
3
5
RETAINER
(d)



4. Detaching the FF/REW Motor

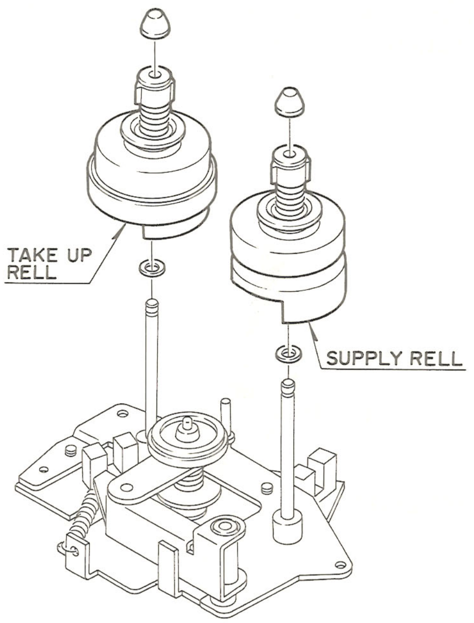
1. Remove the mechanism block.
2. Remove the solenoid mounting bracket.
3. Remove the main motor mounting bracket.
4. Remove the flywheel (For flywheel detaching procedures, refer to paragraph 9 on Page 29).
5. Remove the 3 FF/REW motor mounting screws, (1), (2), and (3).
6. Remove the 2 mounting screws, (1) and (2), for the motor mounted on the motor mounting bracket.


1
P. W. BOARD GOVERNOR
RETAINER
MAIN MOTOR
SUPPORT
2
4
3
5
RETAINER


2
1
3
FF/REW ARM ASSEMBLY
1
2
FF/REW MOTOR

5. Detaching the Supply and Tape-up Real Disk

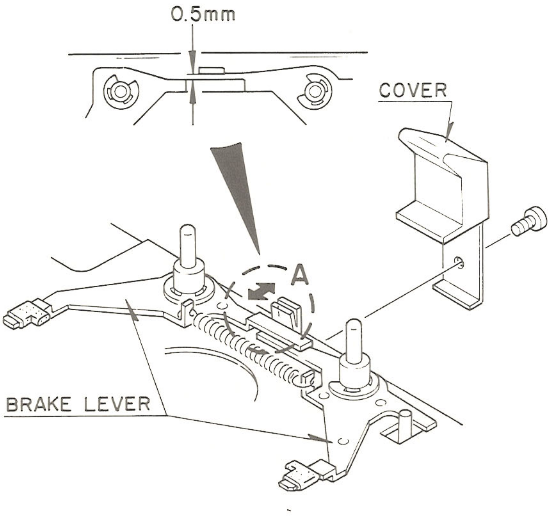
1. Remove the caps A holding the reel disks in place.
2. Release the brake lever and remove the reel disks.


TAKE UP RELL
SUPPLY RELL

5. MECHANICAL ADJUSTMENT

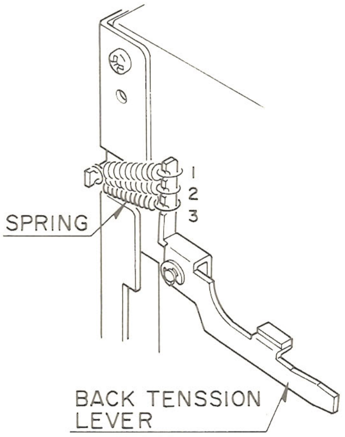
1. Brake Timing Adjustments

1. Remove the cover.
2. Adjust by bending portion (A) of the brake lever (076N) so that brake timings of the supply and take-up sides coincide with each other.
3. Set brake lever clearances to approximately 0.5 mm on both the supply and take-up sides.



2. Back Tension Adjustments

1. Alter the spring location, (1), (2), or (3), so that the back tension is between 3.5g and 6g.



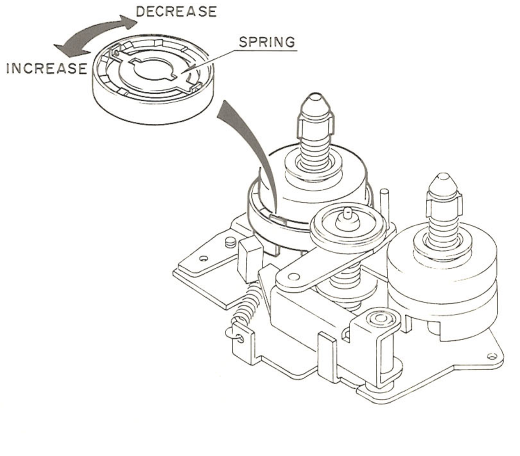
3. Play Torque Adjustment

Put the two pawls of the circular plate spring on proper stepped position of the reel rest. The adjustable torque range is 40 to 70 g-cm.

To make the torque high, put the pawls on a shallow step. For lower torque, put them on a deeper step.

Torque can be adjusted by shifting position of the spring P/N 4397115040.

The torque ranges from 40 to 70 g-cm.



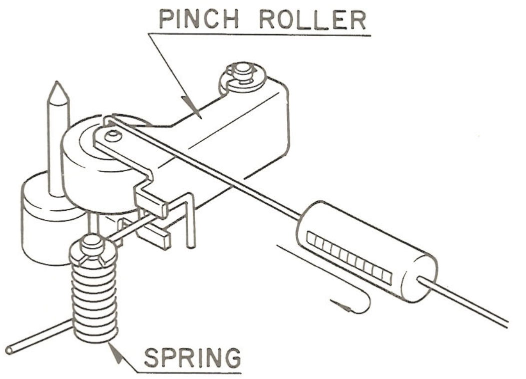
4. FF and REW Torques are not Adjustable

- * If FF or REW functions are inadequate, renew the entire block, P/N 4397002420.
- * When the motor (Reel motor M002) is worn, FF and REW modes may not function properly. In such a case, renew the motor.

5. Pinch Roller Pressure

330g ± 50g

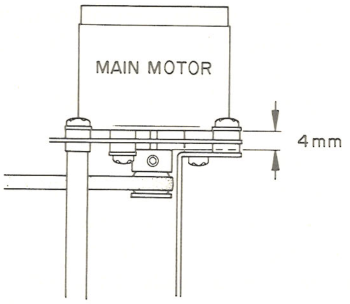
Measure the pressure of the pinch roller using a gauge as shown. For measurement, draw the pinch roller in the arrow direction in which it is detached from the capstan shaft and gradually return it toward the capstan. Read the gauge at the time when the pinch roller starts turning. The standard pressure is 330g ± 50g.



6. Motor Pulley Adjustments

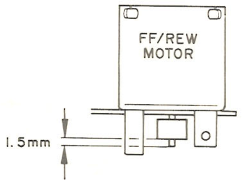
Loosen the set screw and adjust the motor pulley position until the clearance between the pulley and motor is 4 mm as shown. Tighten the set screw.

* Main Motor


MAIN MOTOR
4mm

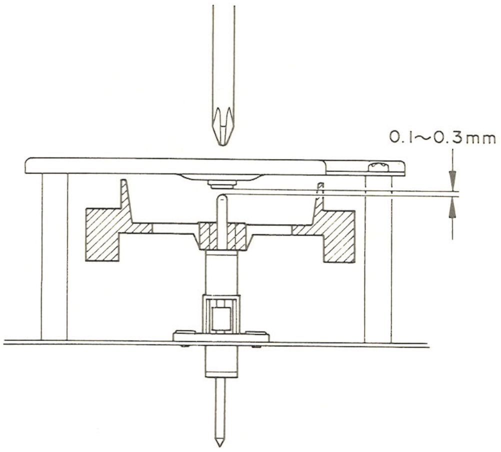
* FF/REW Motor

Insert the pulley so that the distance between the motor shaft and the pulley is 1.5 mm.


FF/REW MOTOR
1.5mm

7. Flywheel Thrust

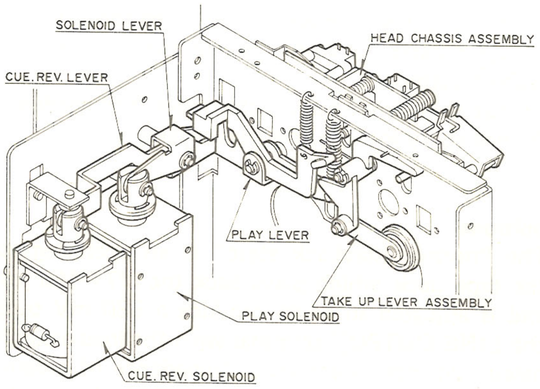
Adjust the thrust screw at the flywheel bracket until the clearance between the capstan tail end and thrust bearing is 0.1 to 0.3 mm as shown, using a Phillips screw driver. For adjusting, feel of axial dropping of the flywheel for proper clearance as this cannot been seen through. Then paint the screw to lock.

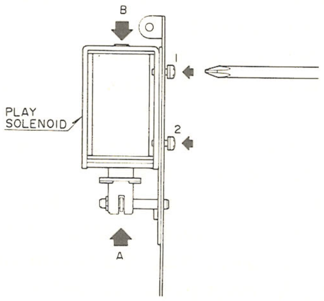


8. Solenoid Adjustments

* Main Solenoid

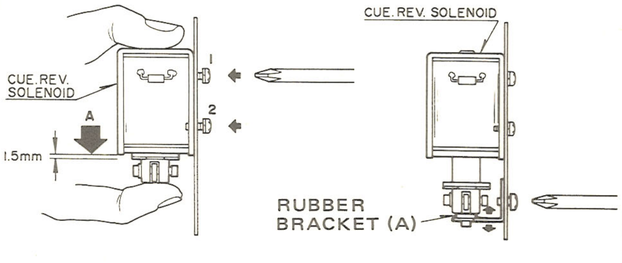
1. Loosen the two Solenoid mounting screws.
2. Push the Solenoid plunger all the way with fingers in the direction of arrow (A). At this point, the head chassis should be in direct contact with the tape-up and supply reel sides.
3. Maintaining this condition, tighten Solenoid mounting screws, (1) and (2). At this time, push the Solenoid lightly to the plunger side in the direction of arrow(B).


SOLENOID LEVER
HEAD CHASSIS ASSEMBLY
CUE. REV. LEVER
PLAY LEVER
TAKE UP LEVER ASSEMBLY
PLAY SOLENOID
CUE. REV. SOLENOID


B
1
PLAY SOLENOID
2
A

* Cue/REW Solenoid

1. Move the head chassis by 1.5 mm from the extreme location where it was pushed.
2. Fasten the Solenoid in this new location. (However, the plunger should remain pushed as far in as possible.)
3. Fasten the mounting rubber bracket (A) so that the plunger touches the rubber when the head chassis moves back all the way.


CUE. REV. SOLENOID
1
CUE. REV. SOLENOID
2
A
1.5mm
RUBBER BRACKET (A)

6. ELECTRICAL ADJUSTMENT

Precautions before Adjustment

1. Before playing the test tape back, thoroughly demagnetize the heads, capstan and similar metal parts using an eraser as the test tape-recorded tone is easily erased.
2. Do not place the test tape on any measuring instrument.
3. Do not put the test tape near a place where the eraser is used.
4. Method of Demagnetization: – Turn the eraser power switch on at a remote position far away from the heads. Bring the eraser close to the heads, capstan and other parts to be demagnetized, and move it up and down four or five times to demagnetize. Slowly separate the eraser far away from the parts, and turn the power switch off.
5. Do not use any magnetized adjusting tool. When using it, demagnetize it from time to time in the course of each adjustment.
6. Do not turn semi-fixed resistor more than needed.
7. Do not apply locking bond excessively.

Definitions

1. The "normal playback state" is an operating state of the tape deck which plays back the MTT-150 test tape and is adjusted so as to produce a 580 mV output at the LINE OUTPUT terminal with the load assuming the measuring instrument input impedance of greater than 100 kΩ and with the TAPE SELECTOR switch set at the NORMAL position.
2. The "normal recording state" is an operating state of the tape deck which records a 1 kHz signal to a specified recording level for which the recording level control is adjusted with the 1 kHz signal applied at a specified input level to the MIC terminal.
   In the normal recording state, therefore, this tape deck is set up with the level control to the state that the Peak Level Displays may illuminate to the 0 VU with a 1 kHz, 1 mV input signal applied.

1. Head Azimuth Adjustment

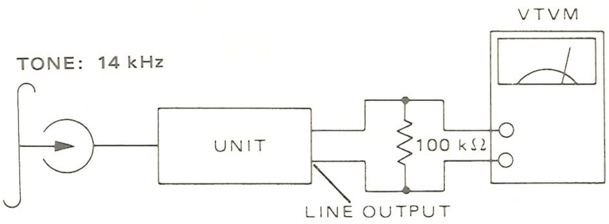
SETUP

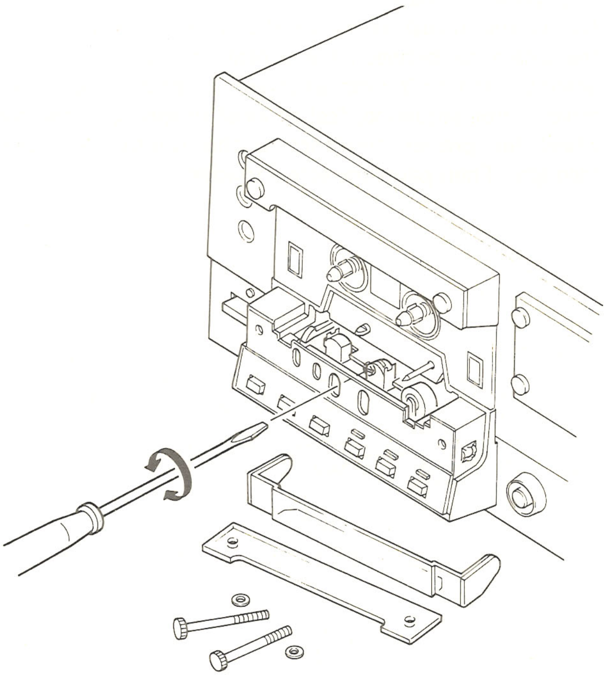
1. Power voltage: – 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. TAPE SELECTOR switch position: – NORMAL.
3. Load: – Measuring instrument input impedance.
4. Output terminal used: – LINE OUTPUT.
5. Test tape used: – MTT-216.
6. Tape speed selector switch: – STANDARD.

PROCEDURES

1. Play the 14 kHz portion of the test tape MTT-216 back. Adjust the head azimuth adjusting screw for maximum VTVM read.
2. If the peak output reads of the right and left channels are different, set the screws to obtain the mechanical center between the peaks.
3. After adjustment, lock the screw with bond.

Mode: Playback





CAUTION

After adjustment, repeat the playback and stop setting a few times to make certain of no head azimuth deviation.

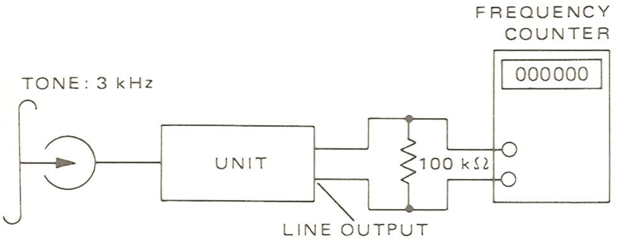
2. Tape Speed Adjustment

SETUP

1. Power voltage:— 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. Output terminal:— LINE OUTPUT (or DIN).
3. Test tape used:— MTT-111 (3 kHz Tone) at 1-7/8 ISP.
   MTT-111SP at 3-3/4 IPS.
4. Unit position:— Vertical.
5. Tape speed selector switch: — STANDARD or HIGH.

PROCEDURES

1. For 1-7/8 ips, play the mid portion of the test tape MTT-111 back. Adjust the tape speed adjusting variable resistor inside the motor for 2990 to 3010 Hz counter indication.
2. For 3-3/4 ips, play the mid portion of the test tape MTT-111 back. Adjust R352 for 5990 to 6010 Hz counter indication.



CAUTIONS

1. The tape deck should be set up in the normal operating condition.
2. Do not turn the variable resistor more than needed.
3. Do not proceed with adjustment after the tape deck terminature has changed.
4. If a strong shock or vibration is applied to the tape deck after adjustment, make certain that the measured tape speed had not changed.
5. If the tape speed deviation occurs, perform the adjustment again.
6. The counter may indicate a wrong value because of too low counter input level.
7. Before adjustment, allow for 30 seconds or more after depressing of the PLAY pushbutton.

NOTE: Be sure to carry out the 1-7/8 ips tape speed adjustment first.

3. Playback Equalizer Adjustment

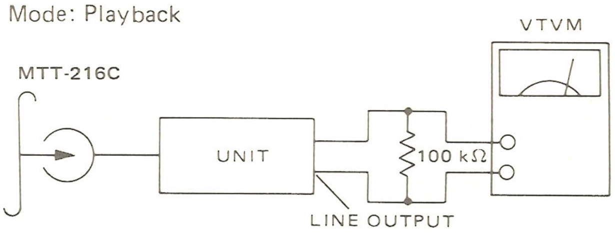
SETUP

1. Power voltage:— 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. TAPE SELECTOR switch position:— NORMAL.
3. Load:— Measuring instrument input impedance.
4. Output terminal:— LINE OUTPUT.
5. Test tape used:— MTT-216.
6. Tape speed selector switch: — STANDARD.

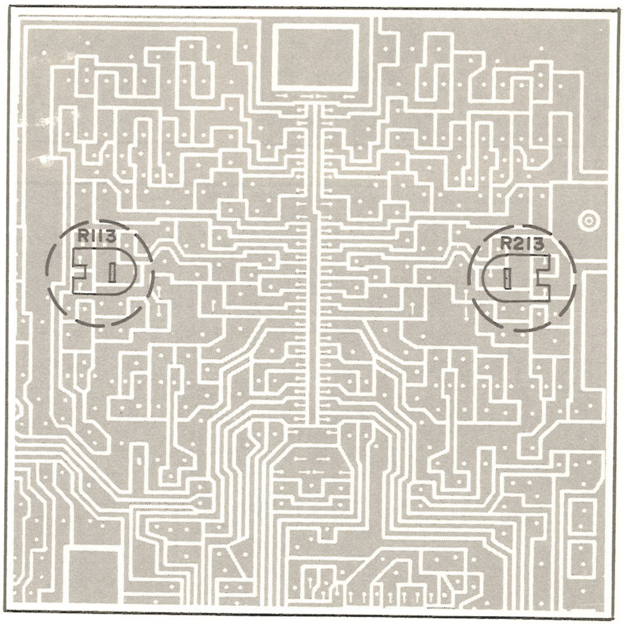
PROCEDURES

1. Play the test tape MTT-216. Let the 315 Hz signal level be reference as 0 dB.
2. Adjust R113 and R213 (5 kΩ each) for 10 kHz frequency response of 0 to −1 dB in reference to the 315 Hz signal level.

NOTE: **1. Proceed both for the right and left channels in the same manner.**
2. Note that clockwise turning of R113 and R213 will increase the 10 kHz signal output level.



PK11

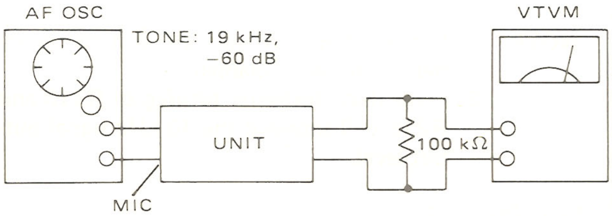


4. LED Meter Adjustment

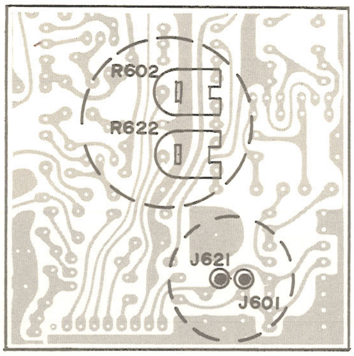
Tape Selector switch – NORMAL position.

PROCEDURES

1. Apply a 1 kHz –60 dB signal from the mic.
2. Select the Rec-Pause mode.
3. Adjust the mic volume to provide 3V DC at J601 (L ch.). (J621 for R ch.).
4. Adjust resistor trimmer R602 (R622 for R ch.) so that the "0" LED lights.
5. Adjust the mic volume to provide 580 mV (AC) at J111 (J210 for R ch.).
6. Adjust R610 resistor trimmer (R630 for R ch.) so that the "+2 " LED lights.



PK21



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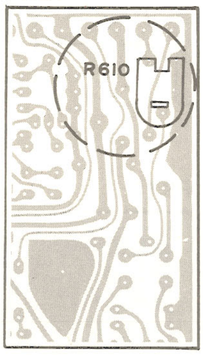

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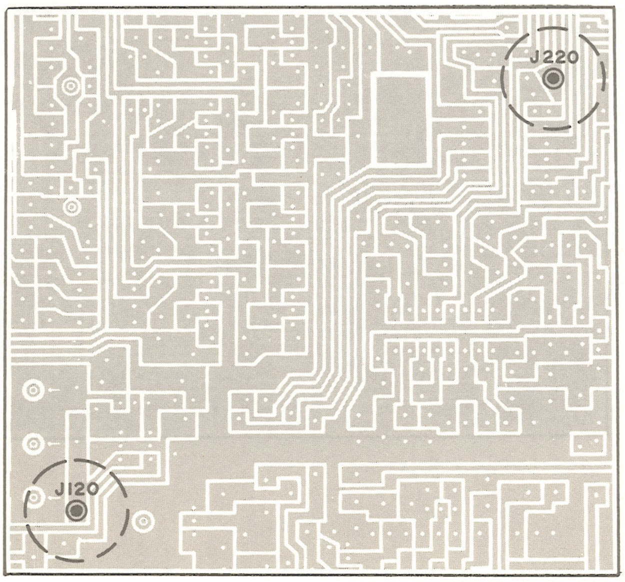


5. Playback Output Adjustment

SETUP

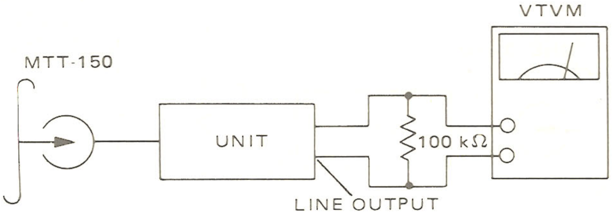
1. Power voltage:– 50 or 60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape selector switch position: – NORMAL.
3. Load:– Measuring instrument input impedance.
4. Output terminal: – J111, J112
5. Test tape used:– MTT-150.
6. Tape speed selector switch: – STANDARD.

PROCEDURES

Play the test tape MTT-150 back. Adjust R120 and R220 (50 kΩ each) for 580 mV playback output level.

NOTE: Proceed both for the right and left channels in the same manner.

Mode: Playback



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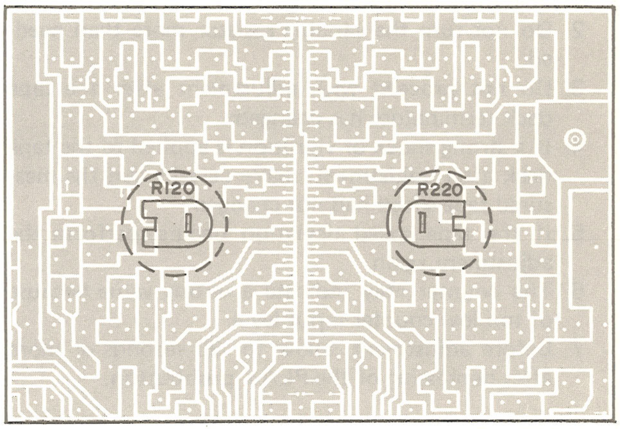


CAUTION

- This adjustment should be performed after the one for the playback equalizer. If the playback equalizer is adjusted after the playback output adjustment, the playback output should be readjusted.
- This adjustment should be performed after the one for the LED meter adjustment.

6. Recording Current Adjustment

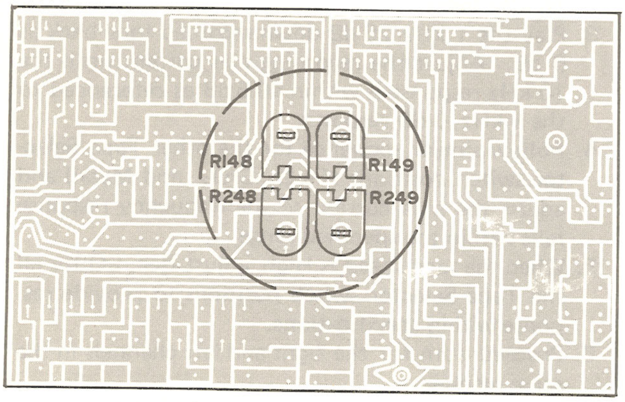
SETUP

1. Power voltage 50/60 Hz AC rated for the unit in the destination country.
2. Input signal:-1 kHz — 60 kB Mic Input
3. Output terminals:- LINE OUT
4. Tape selector switch position: - NORMAL, SPECIAL/CrO₂, Fe-Cr, or Metal
5. Tape speed selector:- STANDARD or HIGH
6. Load:- Measuring instrument input impedance

PROCEDURE

1. In Rec mode, adjust the mic volume to 0 VU. Line Out output at this time is reference level 0 dB.
2. Adjust trimmers to provide a 0 dB output level when tape is recorded and played back.
   STANDARD speed R149 (L ch.) R249 (R ch.)
   HIGH speed R148 (L ch.) R248 (R ch.)

PK11



7. Recording Bias Current Adjustment (Temporal)

SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape speed selector switch: — STANDARD.
3. Output terminal: — R101, R201
4. Load:— Measuring instrument input impedance.

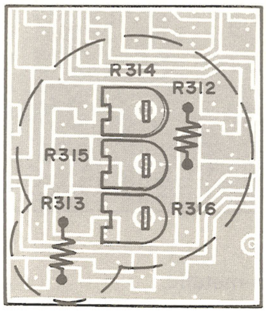
PROCEDURES

1. Select Rec-Pause mode.
2. Connect a VTVM across R101 (R201 for R ch.)
3. Adjust trimmers to provide the following indications on the VTVM:
   (1) Tape Selector in NORMAL position:
   Adjust R410 (L ch.) and R411 (R ch.) to provide 400 mV. (P400)
   (2) Tape Selector in SPECIAL/CrO₂ position:
   Adjust R315 (common for L and R) to provide 530 mV. (PK11)
   (3) Tape Selector in Fe-Cr position:
   Adjust R316 (Common for L and R) to provide 420 mV. (PK11)
   (4) Tape Selector in METAL position:
   Adjust R314 (common for L and R) to provide 700 mV. (PK11)

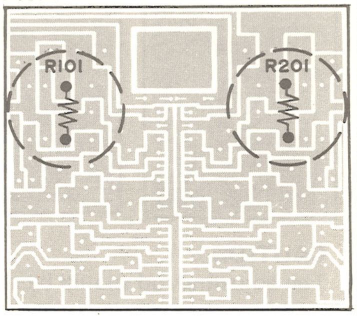
NOTE: 1. Adjust (1) NORMAL position first. If after adjusting other positions R410 or R411 are altered so readjust for all the other positions.

2. The above adjustments are tentative. Finally, adjustments to provide Rec-Playback frequency characteristics failling within specified ranges are necessary.

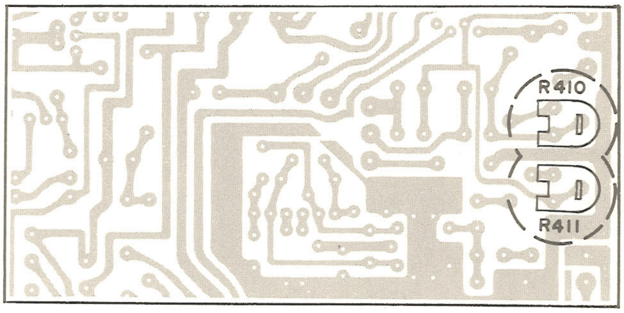
PK11



PK11



P400



8. Recording Equalizer Adjustment

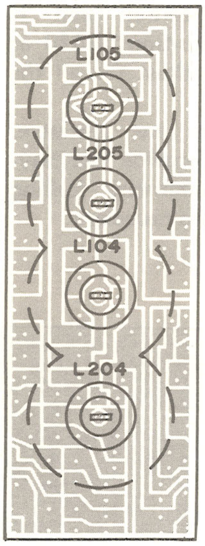
SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unitto be used in a market country.
2. Input level:— —20 dB lower than —60 dB.
3. Tape selector switch: — NORMAL.
4. Output terminal:— R101, R102.

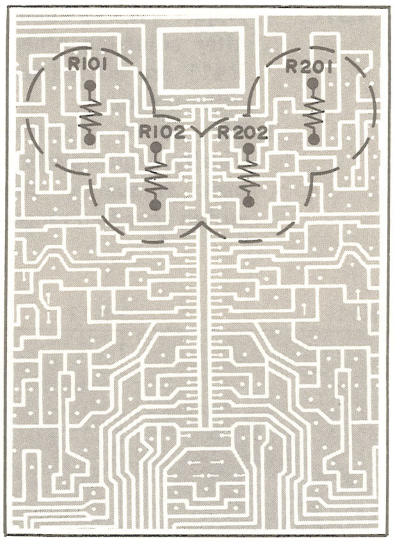
PROCEDURES

1. Stop the recording bias current oscillator. Cutting out the bias circuit.
2. Set up the unit to the normal recording state. Reduce the input level by 20 dB.
3. Set the Tape selector switch to the Normal position. Set the audio-frequency osocillator to 15 kHz. Connect the VTVM R101, R202. Adjust L105 and L205 for maximum VTVM read. Tape speed selector switch — (Standard speed).
4. In turn, set the Tape selector switch to NORMAL position. Set the audio-frequency oscillator to 22 kHz. Connect the VTVM R101, R201. Adjust L104 and L204 for maximum VTVM read. Tape speed selector switch — (High speed).
5. After adjustment, release the recording bias.

PK11



PK11



CAUTION

The adjusting rod should be non-metalic.

9. Record-Playback Frequency Response Adjustment

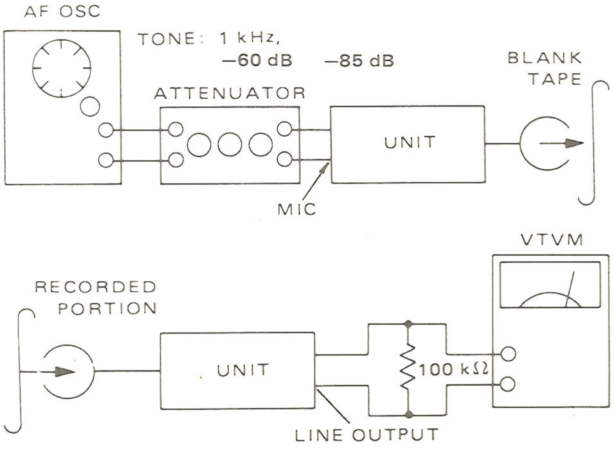
SETUP

1. Power voltage:— 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Tape selector switch: — NORMAL.
   Tape speed selector switch: — STANDARD & HIGH.
3. Input signal:— 1 kHz, —60 dB with —25 dB referenced as 0 dB.
4. Output terminal:— Line out.
5. Load: Measuring instrument input impedance.
6. Playback output level:— Same as the recorded signal level.
7. Blank tape used:— AC-211, AC-511, CS-30 & AC-701.

PROCEDURES

1. Connect the input signal to the MIC terminal. Set up the unit to the normal recording state.
2. In turn, reduce the input level by —25 dB with the use of the attenuator. Record the 1 kHz and 10 kHz tones.
3. Play the 1 kHz 25 dB down recorded tone back as 0 dB. Adjust the recording bias current until the 10 kHz response is within ±0.5 dB as referenced to the 1 kHz, 0 dB response.
4. Follow similar sequence for the other Tape Selector switch positions (Fe-Cr, CrO_2, and Metal) and adjust the bias current so the frequency response falls within the specified range.
5. When the tape speed is High, adjust Rec. EQ for all the Tape Selector switch positions to provide response within specifications.
6. Proceed both for the right and left channels in the same manner.
7. If the recording current is recorded reduced in the above adjustment, be sure to measure the distortion.

Mode: Record



Record/Play Back Frequency Response Adjustment

Tape	Standard		High	
	EQ	Bias	EQ	Bias
Normal	○	⊗	○	–
Fe Cr	fix	◎	fix	–
CrO$_2$	fix	◎	fix	–
Metal	fix	◎	fix	–

1. Columns marked ○, ⊗, and ◎ include adjusting arrangement.
2. ○ Concerning fixed EQ columns, only Normal Tape is marked adjustable but if readjusted for Normal Tape, the other tape positions are also affected.
3. ⊗ includes trimming controls for both L ch. and R ch. (2).
   ◎ includes a trimming control common for L ch. and R ch. (1).

10. 19 kHz Filter Adjustment

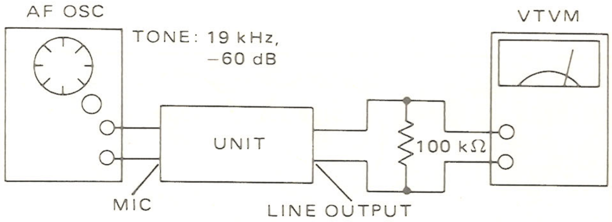
SETUP

1. Power voltage:– 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Input terminal:– 19 kHz, –60 dB.
3. Tape selector switch: – NORMAL.
   Output terminal:– Line out.
4. Load:– Measuring instrument input impedance.

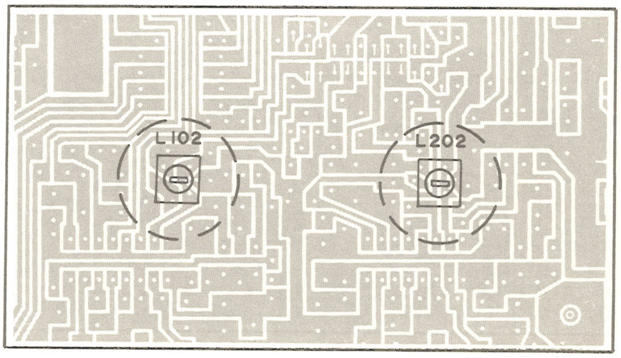
PROCEDURES

1. Connect the 19 kHz, –60 dB input signal to the Mic Input terminal. Adjust the level control for 0 VU.
2. In turn, MPX Filter switch to the ON position. Adjust the L102 and L202 for minimum output level at the Line Out.
3. Proceed both for the right and left channels in the same manner.

Mode: Record



PK11



11. Bias Trap Adjustment

SET UP

1. Power voltage:– 50 Hz/60 Hz AC voltage rated for the unit to be used in a market country.
2. Level control position:– VOLUME MAX.
3. Tape selector switch position:– METAL.

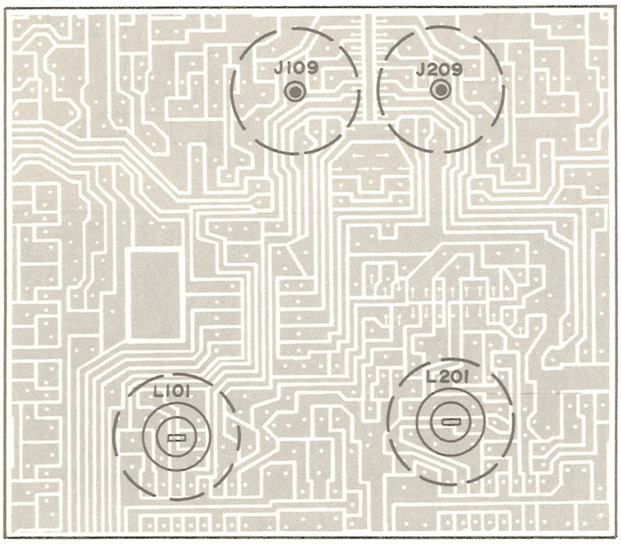
PROCEDURES

1. Set up the unit in the recording mode of operation.
2. Connect the VTVM to J109 and J209 (L ch.) Adjust L101 and L201 (R ch.) for minimum VTVM read.

COUTIONS

1. If the leak bias is less than the specified value, the bias trap need not be adjusted since the adjusting coil is factory preset.
2. Tape adjusting rod used should be nonmetalic.

PK11



12. Phase Compensator Adjustment

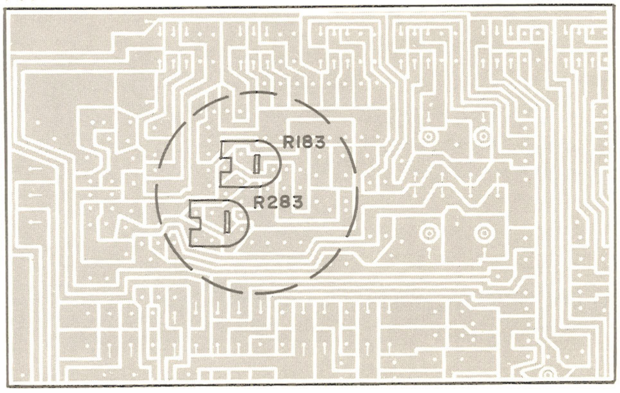
SETUP

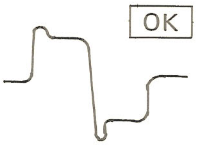
1. Power voltage:– 50/60 Hz
2. Input level:– 1 kHz, –60 dB (square wave)
3. Input terminal:– MIC
4. Tape speed selector switch: – HIGH
5. Dolby:– OFF
6. MPX:– OFF
7. Output:– Line Out (connect oscilloscope)

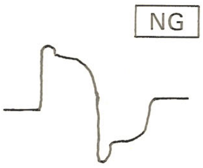
PROCEDURE

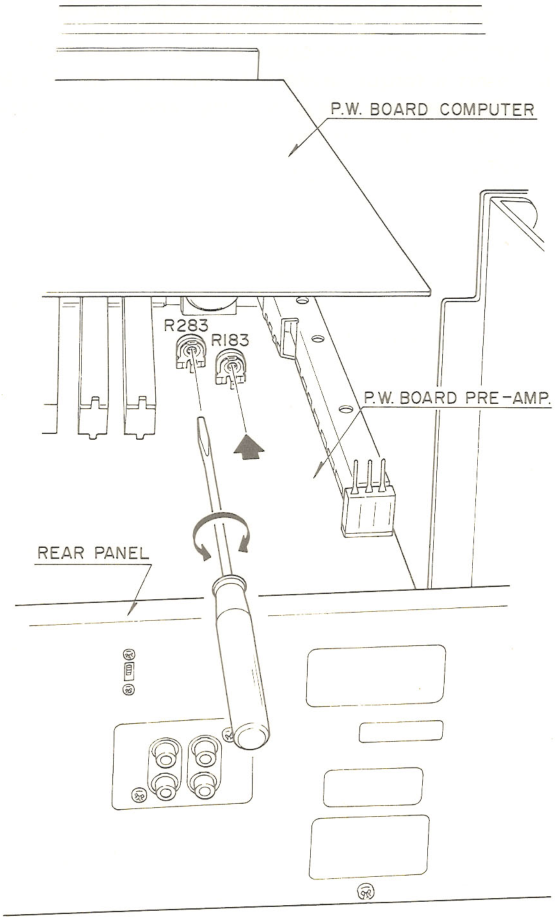
1. Set the tape in recording mode.
2. Depress the pause button to set the tape in REC-PAUSE mode.
3. Adjust the MIC volume control until the LED meter indicates 0 VU.
4. Reduce the MIC input level by 10 dB (–70 dB).
5. Under this condition, release the REC-PAUSE mode and start recording. Play the recorded tape and adjust R183 and R283 until the waveform shown below is obtained. If required, repeat recording and playback.

PK11







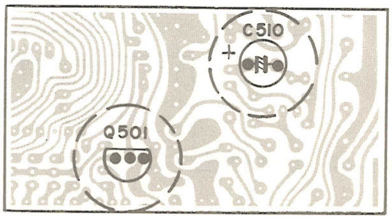

P.W. BOARD COMPUTER
R283
R183
P.W. BOARD PRE-AMP.
REAR PANEL

13. Program Selection by Inter-program gaps – Function Adjustments

SETUP

1. Tape speed selector switch: – NORMAL.
2. Tape selector:– Set to accommodate the music tape used.
2. Tapes to be used:– Should have large level differences between programs and inter-program gaps, and have around 4 second gaps between programs. Pre-recorded popular music tapes, for instance, are adequate.
3. Measurement terminals:– C510 negative side Q501 collector

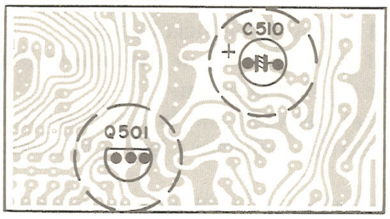
PK21



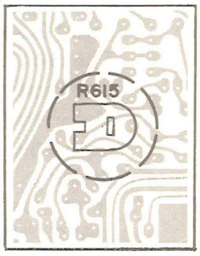
PROCEDURE

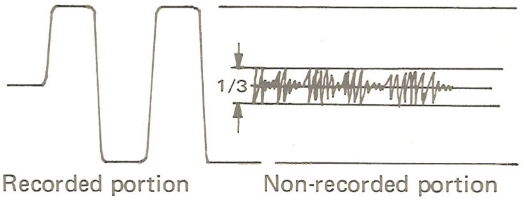
1. Connect the Ch. 1 probe of a synchroscope to the Q501 collector.
2. Connect the Ch. 2 probe of the synchroscope to the negative side of C510.
3. Adjust R615 to provide a ratio of 1/3 or less between the noise levels of recorded and non-recorded portions of the tape.

PK21



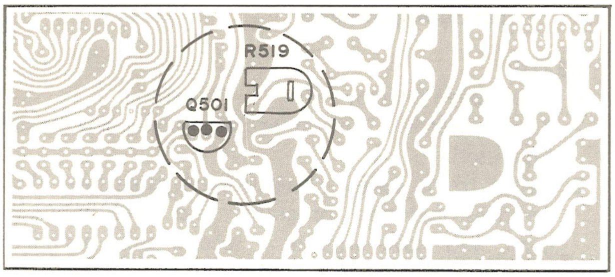
PK21

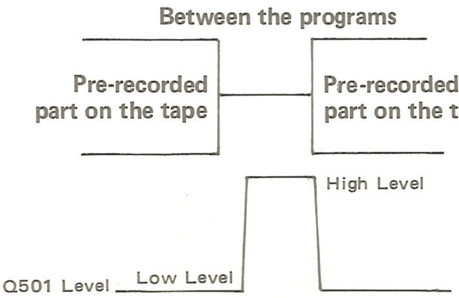



1/3
Recorded portion
Non-recorded portion

4. Next, adjust R519 as follows:
   - * Turn R519 to the extreme counterclockwise.
   - * Slowly turning R519 clockwise, watch Q501's collector waveform.
   - * Stop turning where, between programs, Q501's collector level becomes "Low".
   - * Turn clockwise further by approximately 10° beyond this position.

PK11





- * Select the Play-Pause mode.
  At this time make sure that Q501's collector level becomes "High" for 2 to 3 seconds.
- * Next release Pause, and make sure that the collector level becomes "Low" in the recorded portion.

5. When in the Cue mode:
   - * Put the microcomputer in the Program Playback mode, such as Program Inputs 2 and 4, for example.
   - * Input 2 and 4 and push the Start button.
   - * The unit will Rewind and run the tape in the Cue mode for the first program.
   - * Make sure that between the first and second programs Q501's collector level becomes "High".
   - * If at this time the unit malfunctions, readjust R519. (Readjust so as to lower the overall level.)

NOTE: **When R519 is readjusted, make sure performance in the Play mode is natural.**

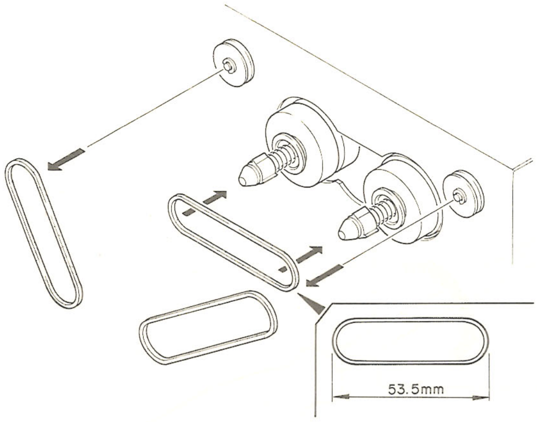
14. Tape Slack Prevention Circuit Adjustments

a. Set the mechanism operation button to STOP.
b. Insert a torque cassette, or short-circuit J519 and J502. (By shorting circuit, the reels always rotate.)
c. Adjust RM11 so that the torque becomes 35 to 50 g-cm.
d. Remove the shorting wire after adjustment.

NOTE: **This circuit functions only for a second or two after switching the power on. Therefore, the torque cassette procedure should be repeated several times to adjust to the specified torque.**

15. Adjustment of Reel Base Speed in FF/REW mode for Adjustment, Use a Digital Stroboscope

1. a. Set the tape in FF mode.
   b. Adjust RM34 until the speed of the take-up reel base reaches 1070 rpm.
2. a. Adjust so that the speed of the take-up reel base is equal to the speed of the supply reel base.
   Example 1: Use a rubber band as shown below.



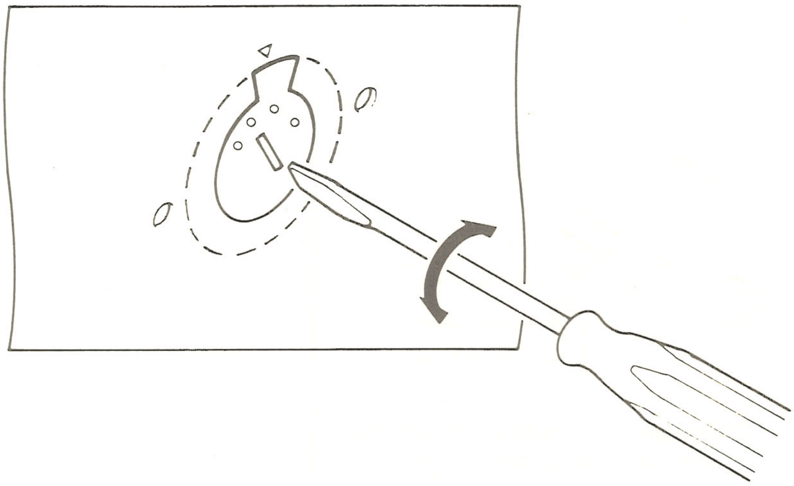
   2: Engage the rubber band with the reel bases as shown in the illustration.
   3: Before engaging the rubber band, remove the mechanism case.

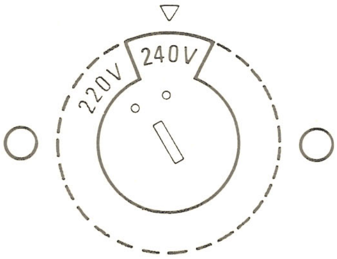
   b. Set the tape in FF mode.
   c. Adjust RM48 until the speed of the tape-up reel base reaches 700 rpm.

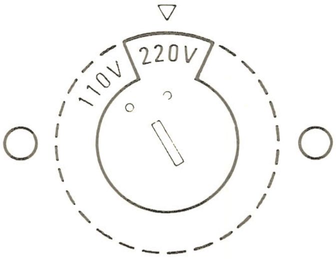
7. VOLTAGE CONVERSION FOR EUROPEAN MODEL

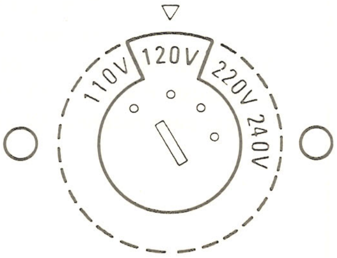
To convert the unit to a different power source voltage, change the position as illustrated in the drawing below.

CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE. DO NOT DISASSEMBLE THE VOLTAGE SELECTOR ABSOLUTERY.





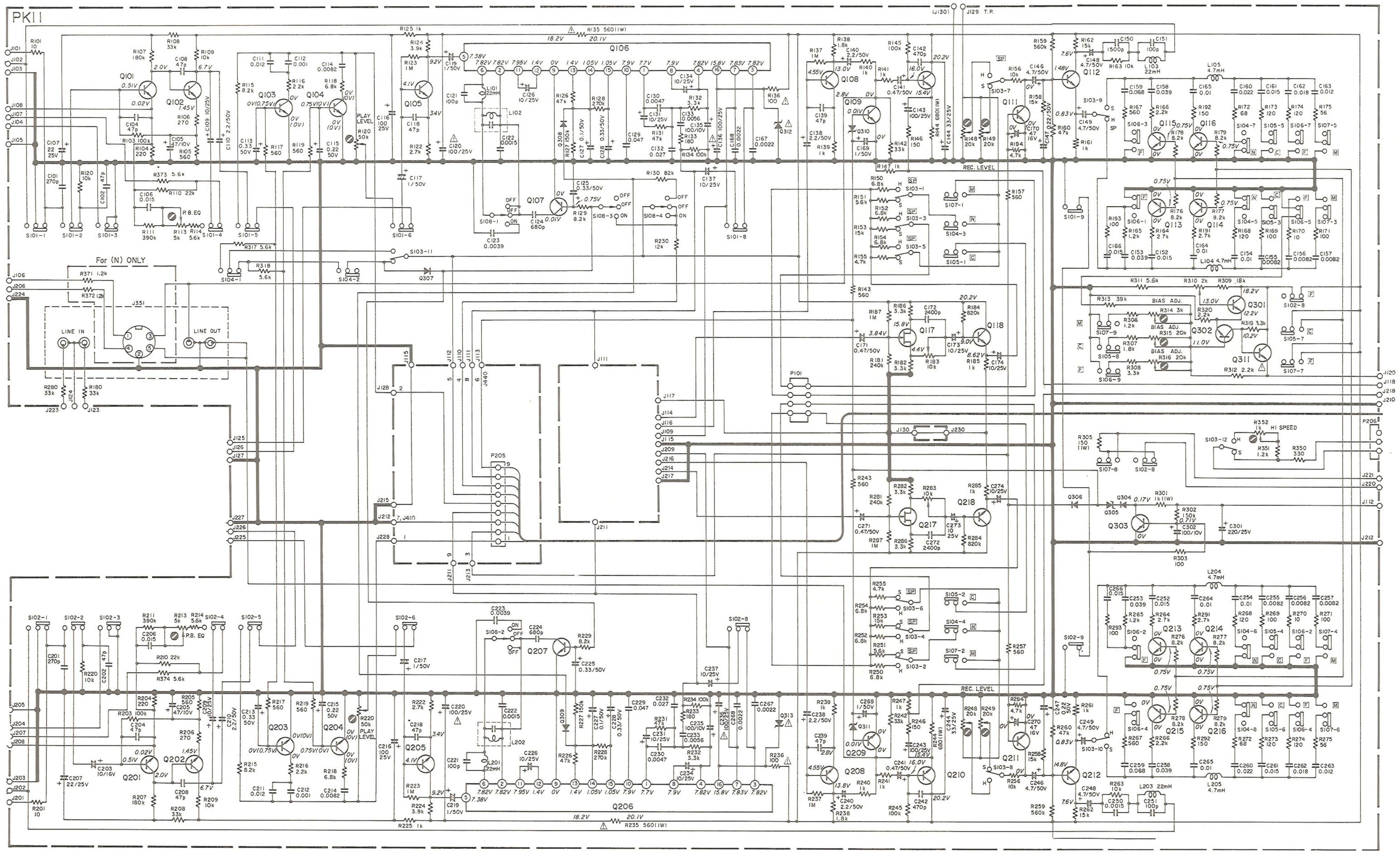


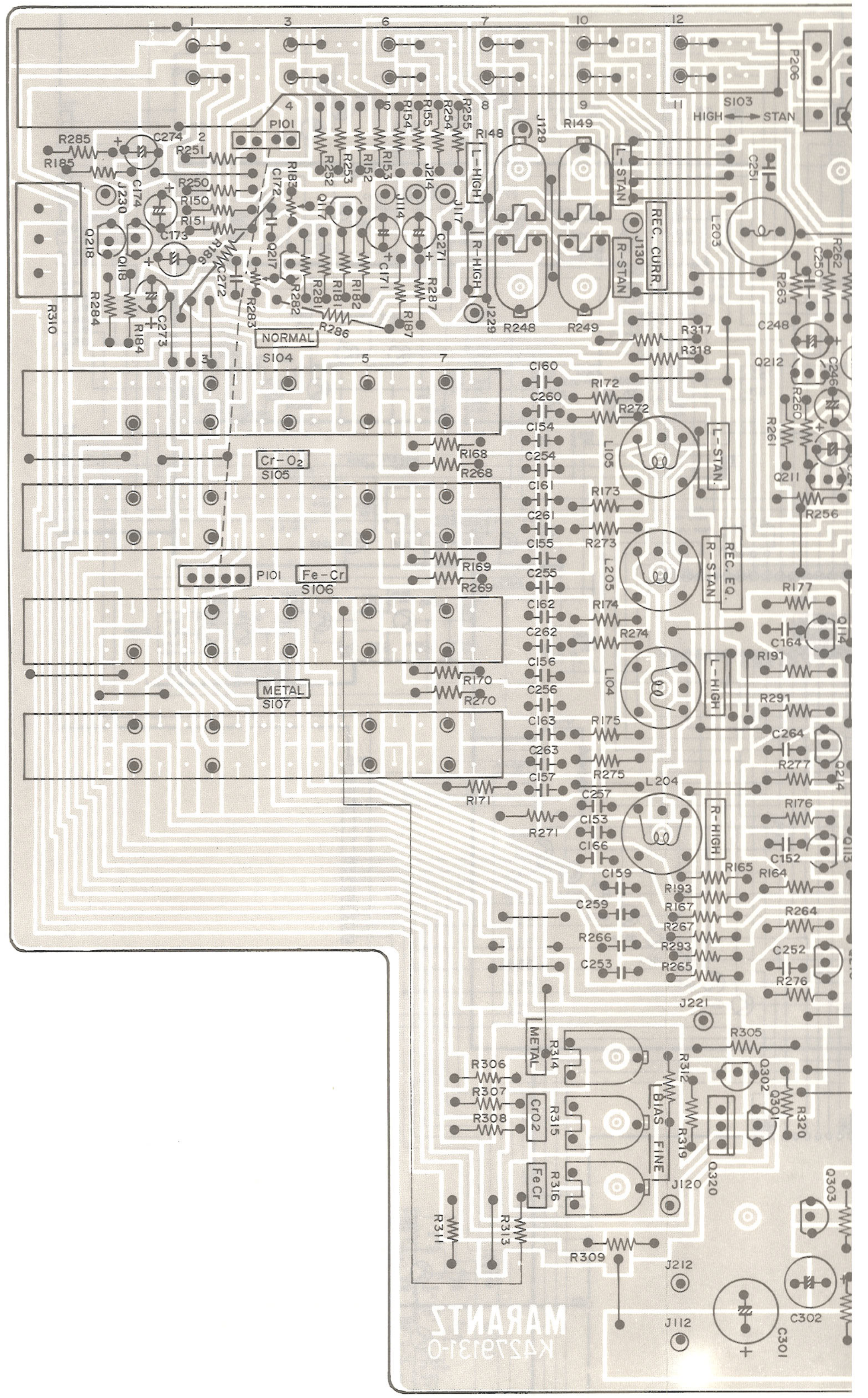


Note on safety: The parts marked with ⚠ are important parts on the safety. Please use the parts having the designated parts number without fail.

8. DIAGRAM AND COMPONENT LOCATIONS

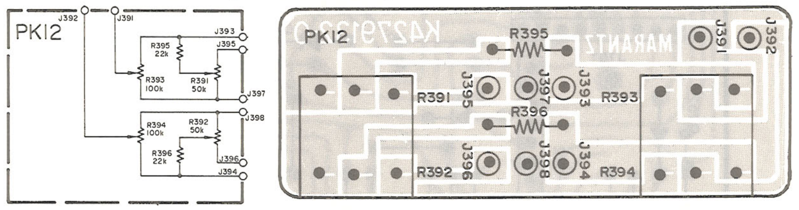
8.1 Pre Amp. Assembly (PK11) Schematic Diagram and Component Locations


PK11
Q106
Q206
For (N) ONLY
LINE IN
LINE OUT
P.B. EQ
PLAY LEVEL
REC. LEVEL
BIAS ADJ.
HI SPEED
P205


S103
HIGH
STAN
P101
NORMAL
S104
Cr-O2
S105
Fe-Cr
S106
METAL
S107
L-STAN
R-STAN
REC. CURR.
REC. EQ
L-HIGH
R-HIGH
BIAS
FINE
MARANTZ
K427913-1-0

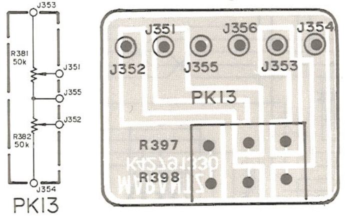
8.2 Mic Line Volume Assembly (PK12)

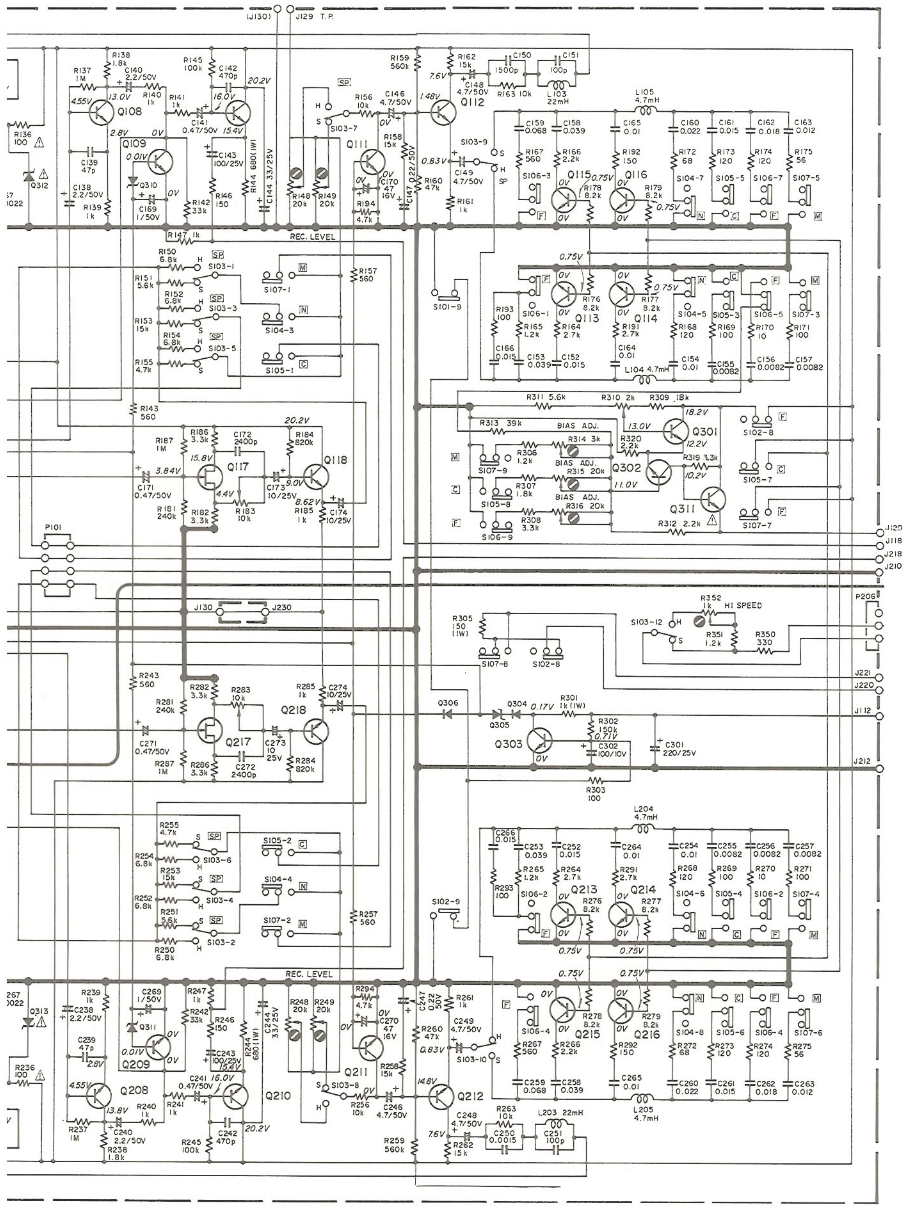
Schematic Diagram and Component Locations


PK12
R395
R391
R393
R396
R392
R394
J391
J392
J393
J394
J395
J396
J397
J398
MARANTZ
K427912

8.3 Output Volume Assembly (PK13)

Schematic Diagram and Component Locations

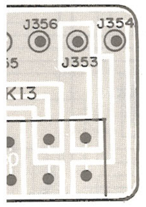

PK13
J351
J352
J353
J354
J355
J356
R397
R398



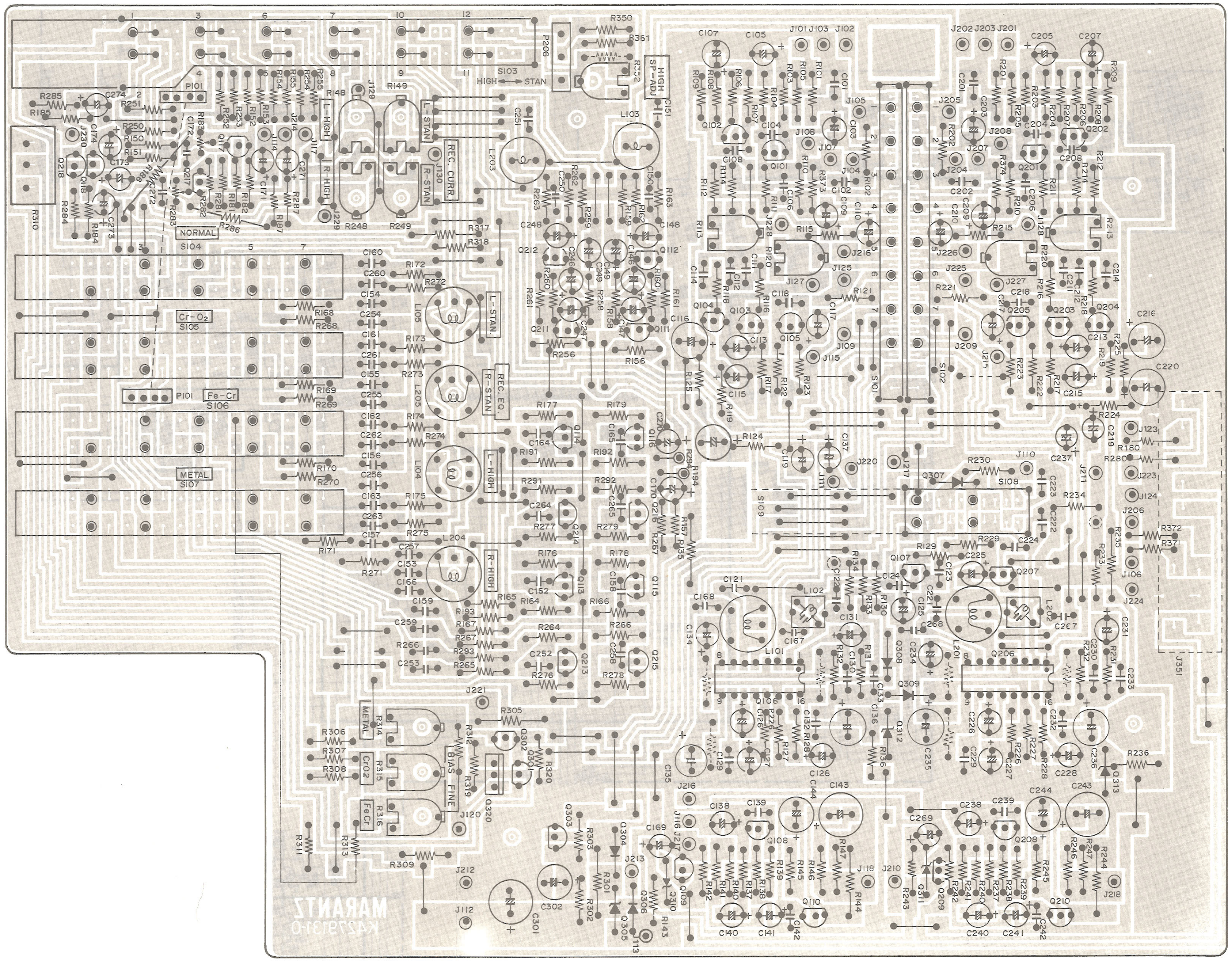
REC. LEVEL
BIAS ADJ.
HI SPEED
P101
P206
J130
J230

me Assembly (PK13)

iagram and Component Locations

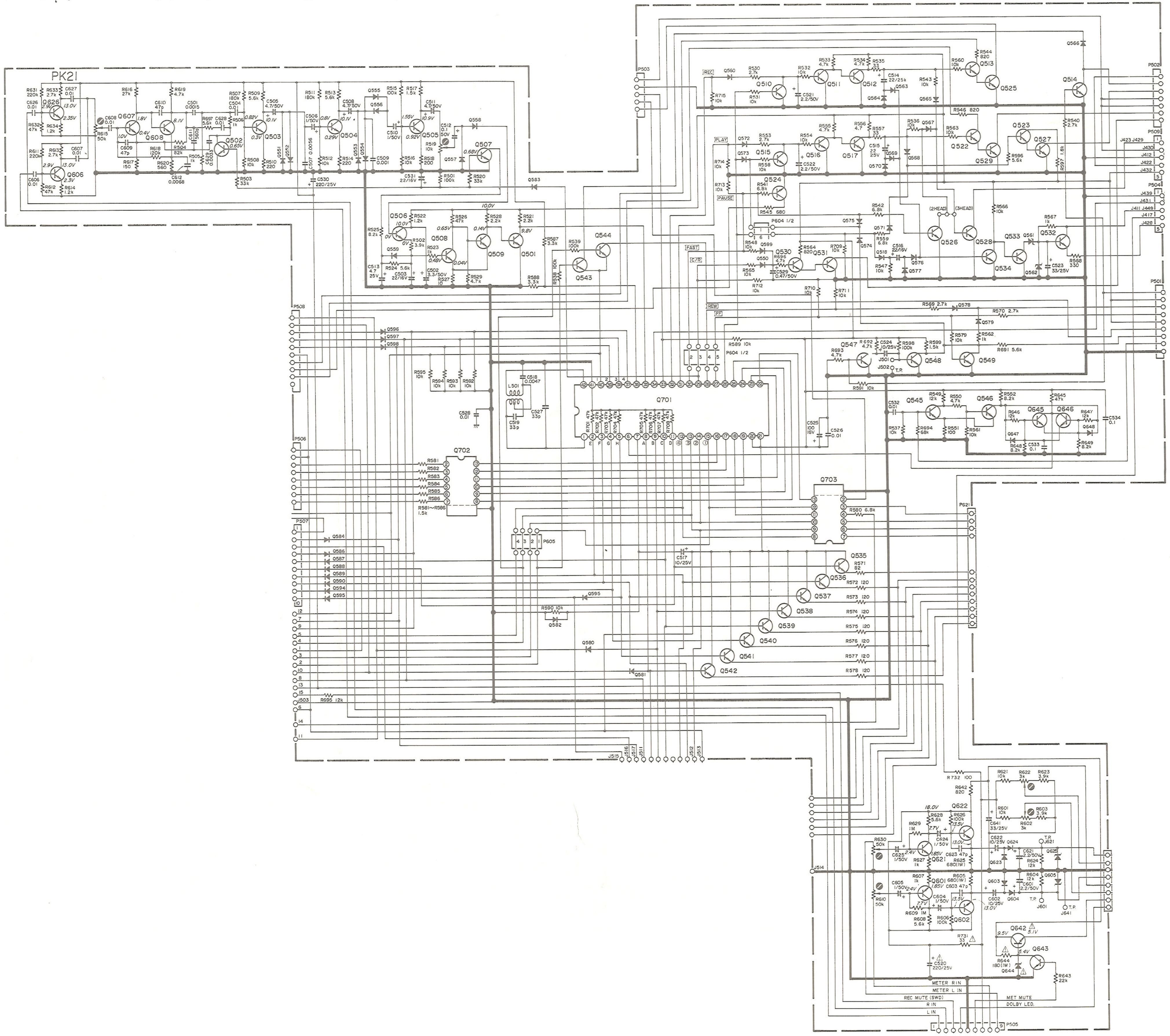


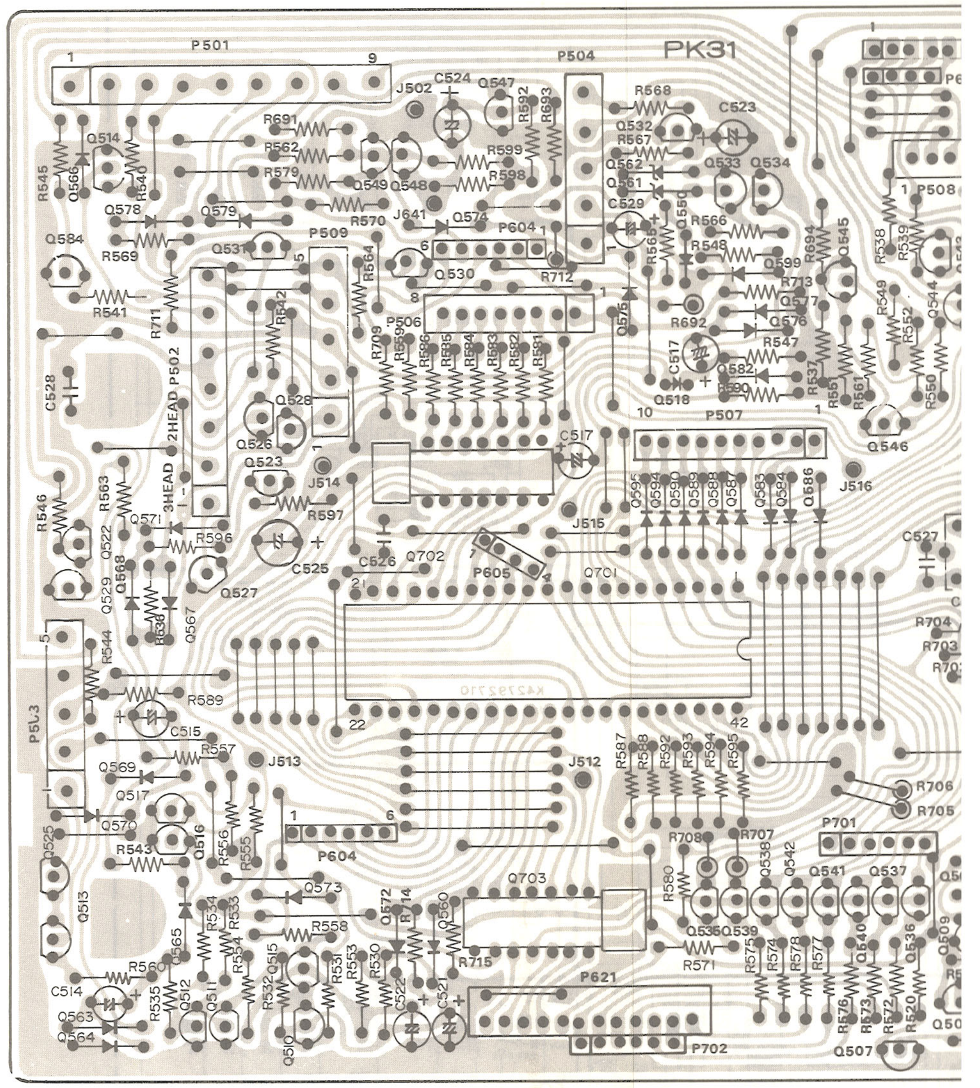
J356
J354
J353
K13



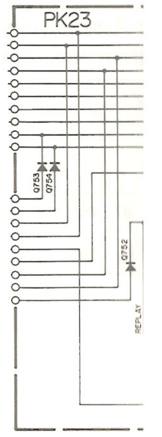
NORMAL
S104
Cr-O2
S105
Fe-Cr
S106
METAL
S107
P101
S103
HIGH ⟷ STAN
SP-ADJ
HIGH
L-HIGH
R-HIGH
L-STAN
R-STAN
REC. CURR
REC. EQ
BIAS
FINE
CrO2
FeCr
S101
S102
S108
S109
J351
MARANTZ
K4279131-0

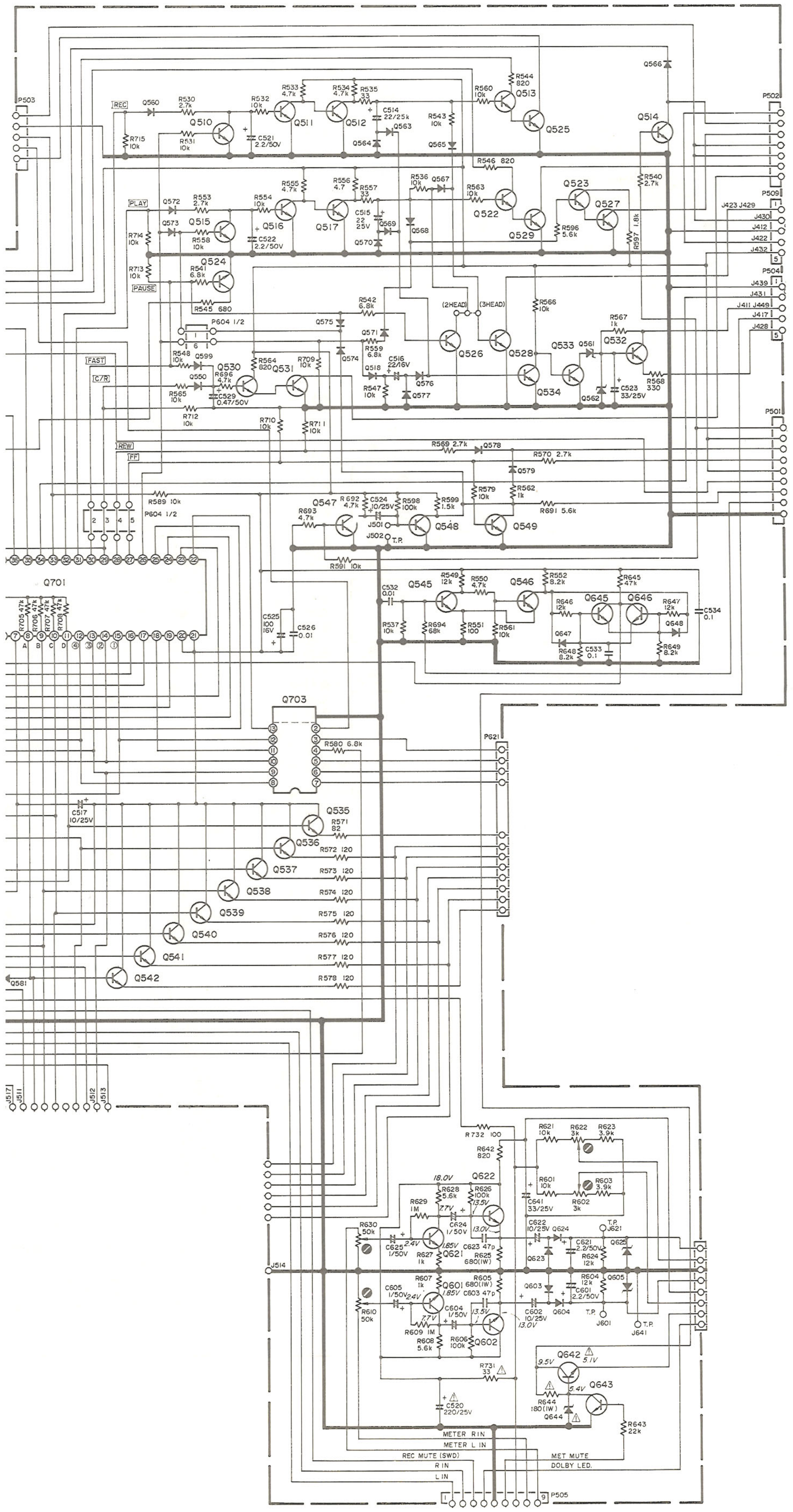
8.4 Computer Assembly (PK21) Schematic Diagram and Component Locations

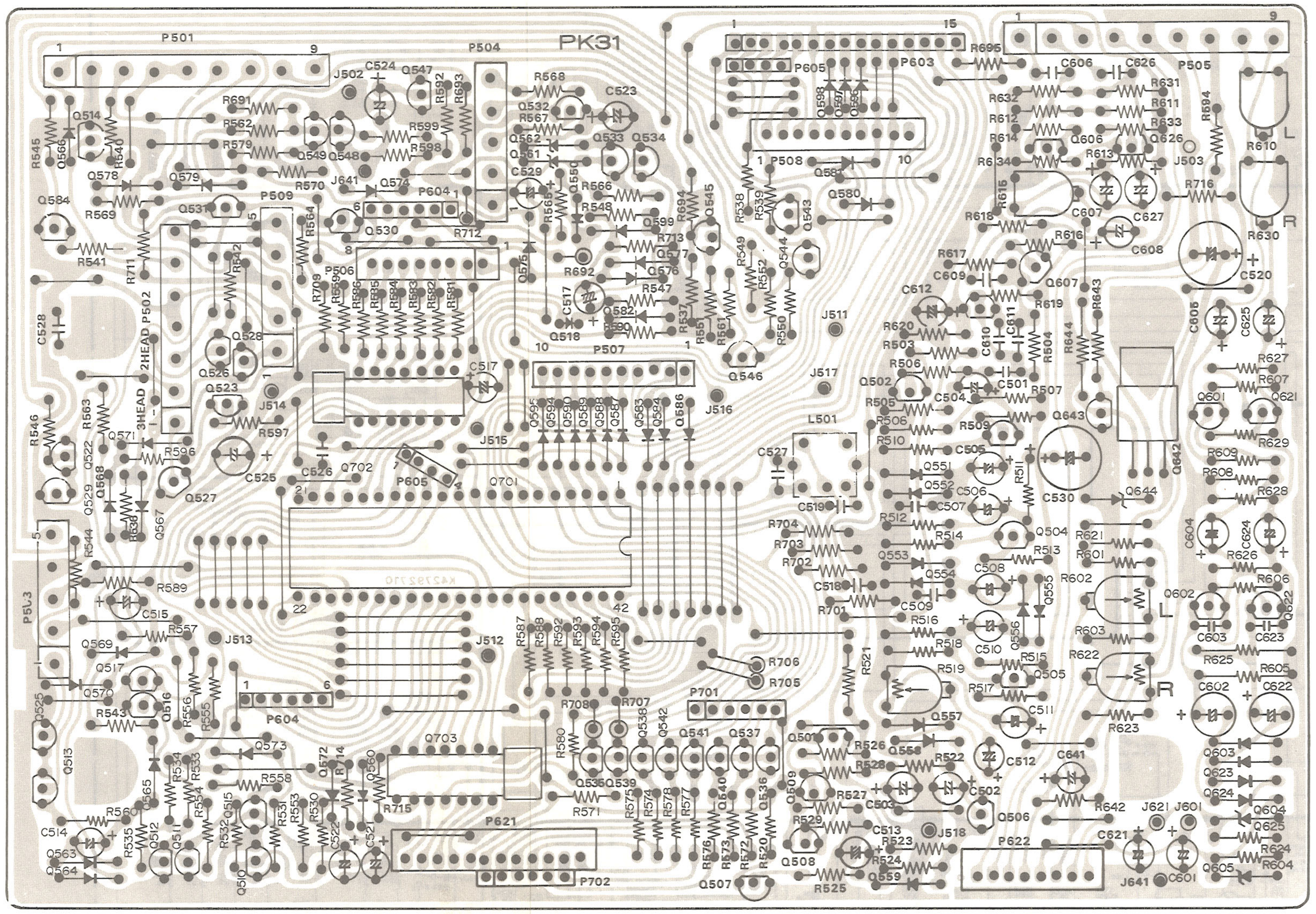

PK21
Q701
Q702
Q703
P501
P502
P503
P504
P505
P506
P507
P508
P509
P621
J514
J515
REC
PLAY
PAUSE
FAST
REW
FF
METER R IN
METER L IN
REC MUTE (SW0)
R IN
L IN
MET MUTE
DOLBY LED

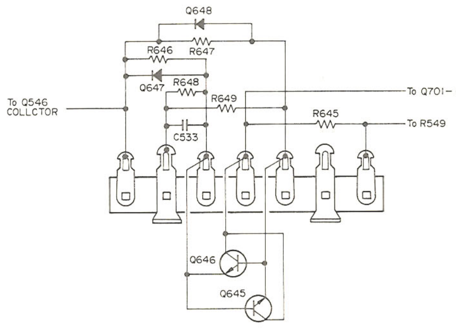

PK31
P501
P504
P506
P507
P509
P604
P605
P621
P701
P702
Q701
Q702
Q703
J512
J513
J514
J515
J516
3HEAD
2HEAD
P502

8.5 Progran

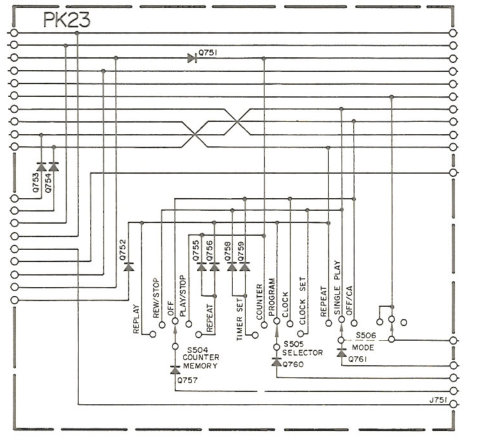


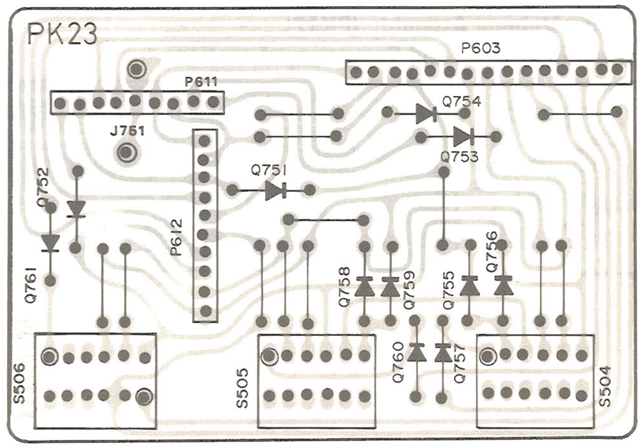

P503
P502
Q701
Q703
J514
P621
P505
METER R IN
METER L IN
REC MUTE (SWD)
R IN
L IN
MET MUTE
DOLBY LED


PK31
P501
P504
P603
P605
P505
P508
P509
P506
P507
P502
P604
P701
P621
P702
P622
L501
Q701
Q703

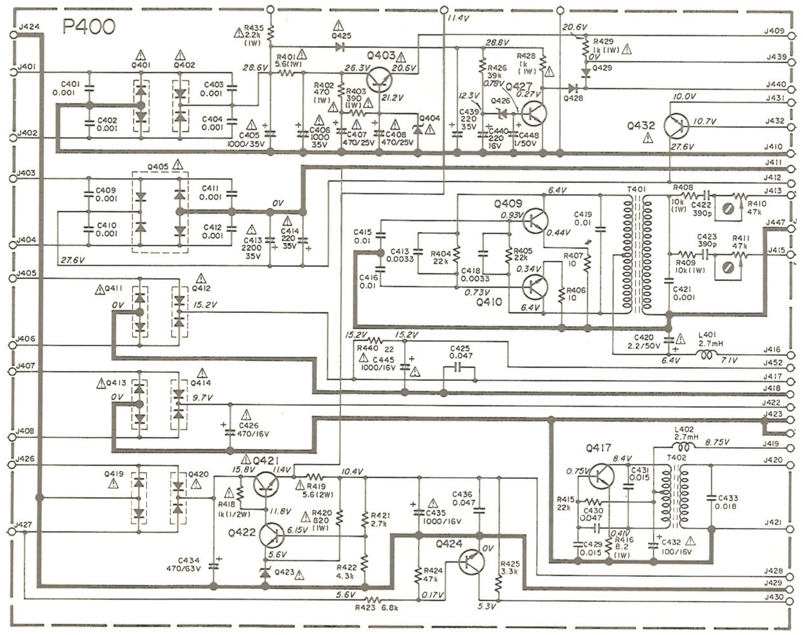

Q648
R646
R647
Q647
R648
R649
C533
R645
To Q546 COLLCTOR
To Q701-6
To R549
Q646
Q645

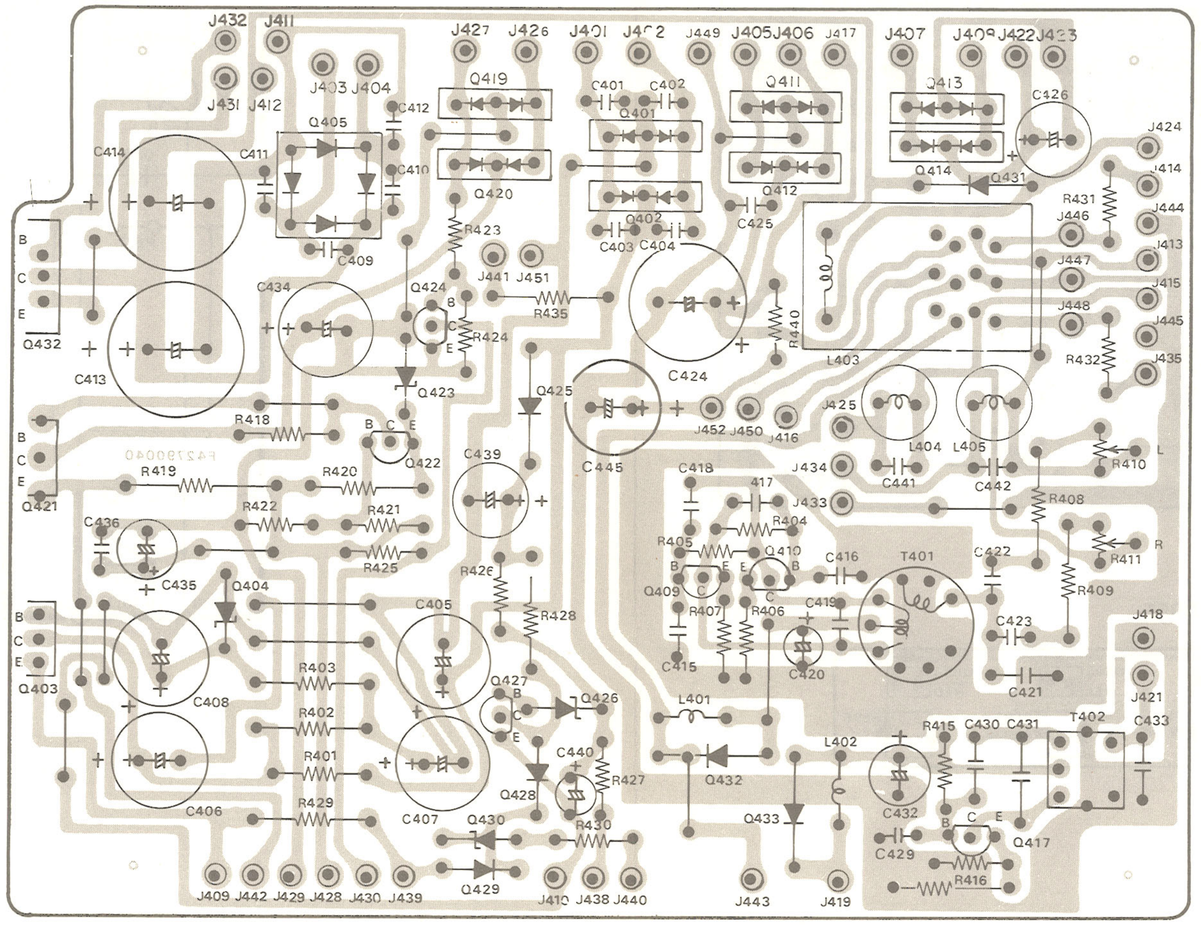
8.5 Program Selector Assembly (PK23) Schematic Diagram and Component Locations


PK23
Q751
Q752
REPLAY
MEM/STOP
PLAY/STOP
REPEAT
TIMER SET
COUNTER
PROGRAM
CLOCK SET
REPEAT
SINGLE PLAY
OFF/CA
S504 COUNTER MEMORY
S505 SELECTOR
S506 MODE
Q757
Q760
Q761
J751

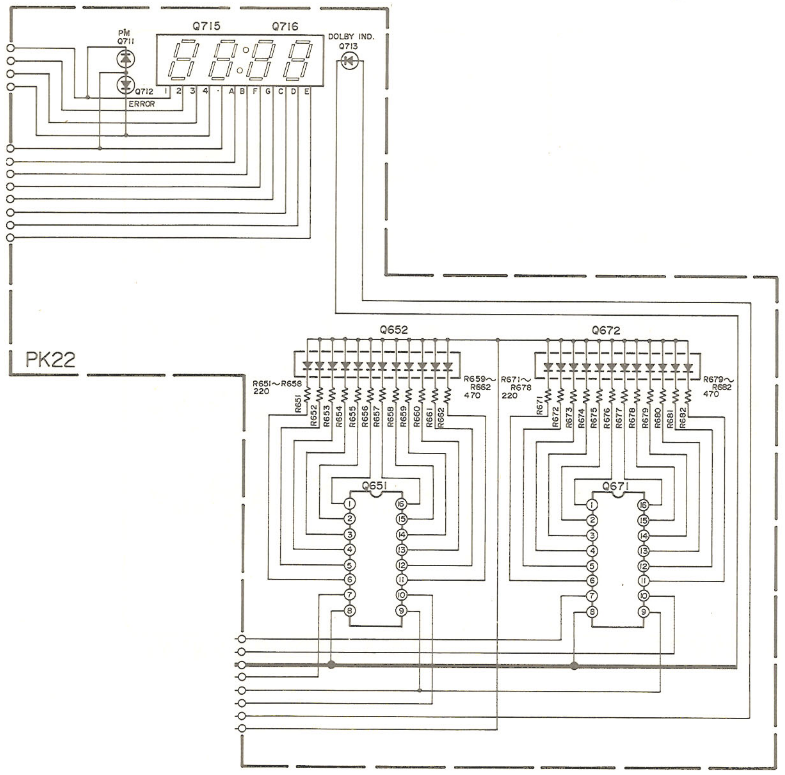

PK23
P603
P611
P612
J751
Q751
Q752
Q753
Q754
Q755
Q756
Q757
Q758
Q759
Q760
Q761
S504
S505
S506

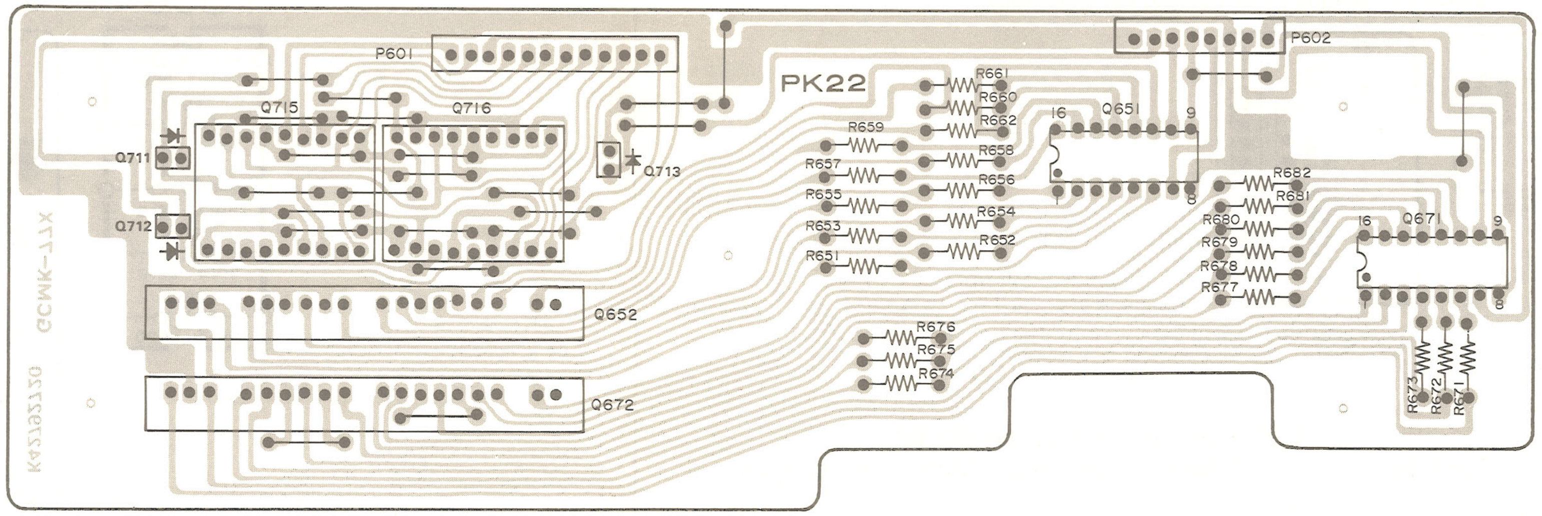
8.6 Power Supply and Bias OSC Assembly (P400) Schematic Diagram and Component Locations


P400
Q401
Q402
Q403
Q404
Q405
Q409
Q410
Q411
Q412
Q413
Q414
Q417
Q419
Q420
Q421
Q422
Q423
Q424
Q425
Q426
Q427
Q428
Q432
T401
T402
L401
L402

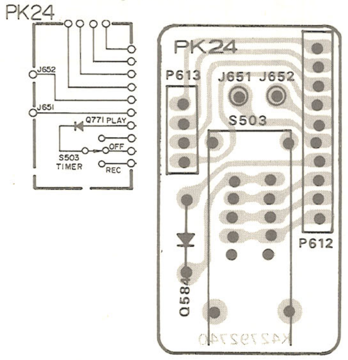

J432
J411
J427
J426
J401
J449
J405
J406
J417
J407
J422
J423
Q419
Q411
Q413
Q401
Q402
Q405
Q420
Q412
Q414
Q424
Q423
Q425
Q422
Q404
Q427
Q426
Q428
Q430
Q429
Q410
Q409
Q432
Q433
Q417
Q421
Q403
T401
T402
L401
L402
L403
L404
L405
C413
C414
C424
C445
C439
C405
C406
C407
C408
J409
J442
J429
J428
J430
J439
J410
J438
J440
J443
J419

8.7 Digital and Meter LED Assembly (PK22) Schematic Diagram and Component Locations

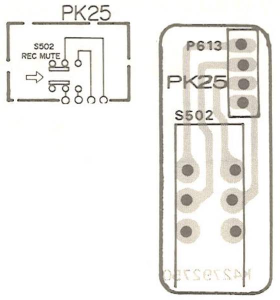

Q715
Q716
FM Q711
Q712
ERROR
DOLBY IND. Q713
PK22
Q652
Q672
Q651
Q671


P601
P602
PK22
Q715
Q716
Q711
Q712
Q713
Q651
Q671
Q652
Q672

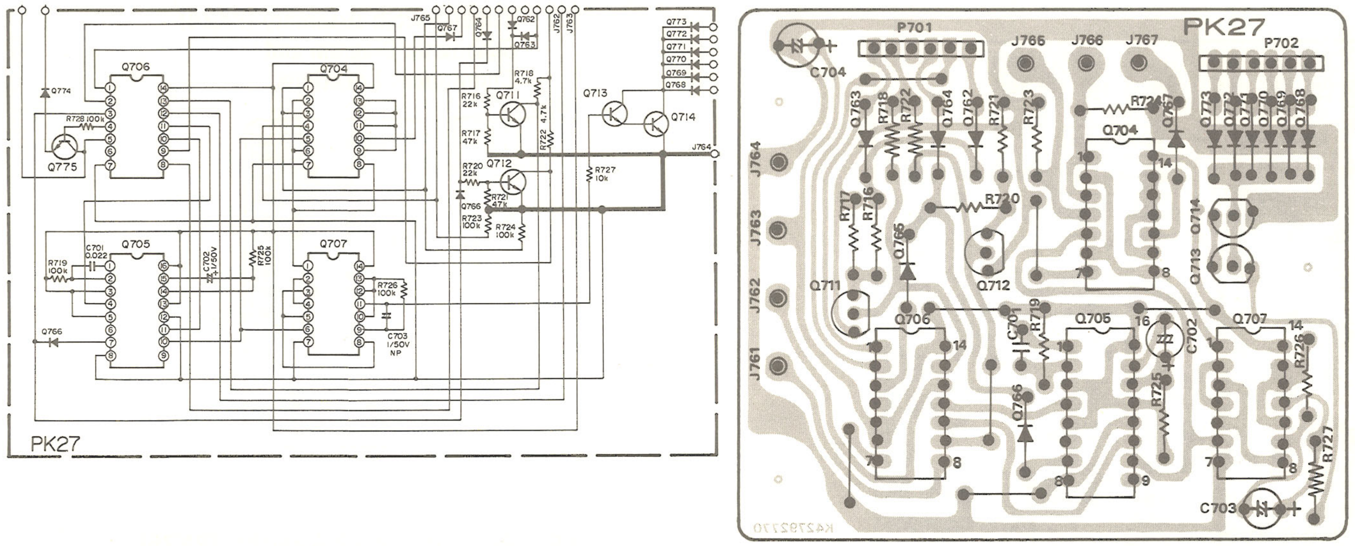
8.8 Timer Switch Assembly (PK24) Schematic Diagram and Component Locations


PK24
S503 TIMER
PLAY
OFF
REC
P613
J651
J652
S503
P612

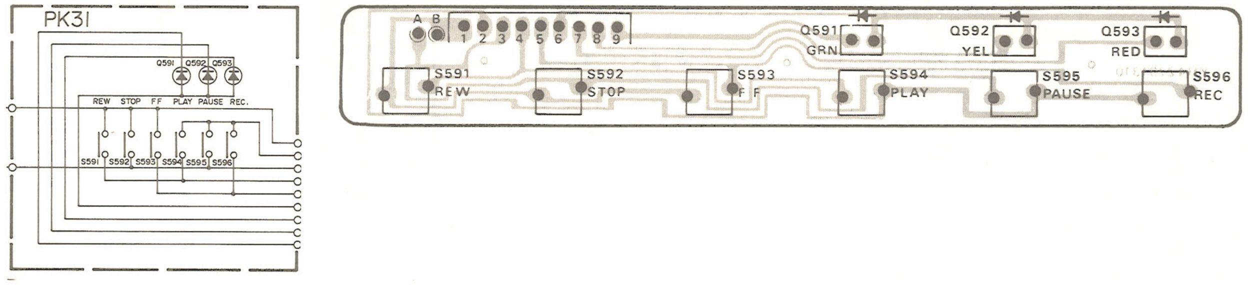
8.9 Rec-Mute Switch Assembly (PK25) Schematic Diagram and Component Locations


PK25
S502 REC MUTE
P613
PK25
S502

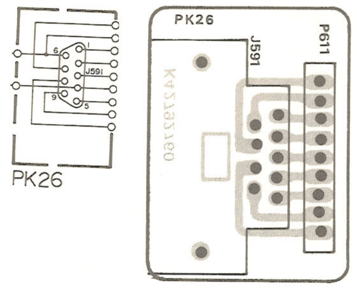
8.10 Program Select Assembly (PK27) Schematic Diagram and Component Locations


Q706
Q704
Q705
Q707
Q711
Q712
Q713
Q714
Q775
PK27
P701
P702
J761
J762
J763
J764
J765
J766
J767
C702
C703
C704
R716
R717
R718
R719
R720
R722
R723
R724
R725
R726
R727

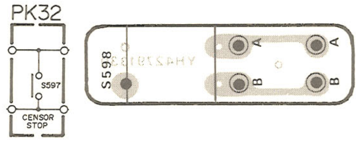
8.11 Logic Control Assembly (PK31) Schematic Diagram and Component Locations


PK31
Q591
Q592
Q593
GRN
YEL
RED
S591 REW
S592 STOP
S593 FF
S594 PLAY
S595 PAUSE
S596 REC

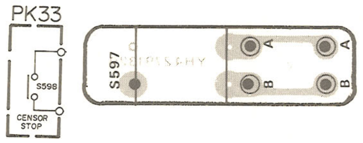
8.12 Remote Jack Assembly (PK26)
Schematic Diagram and Component Locations


PK26
J591
P611

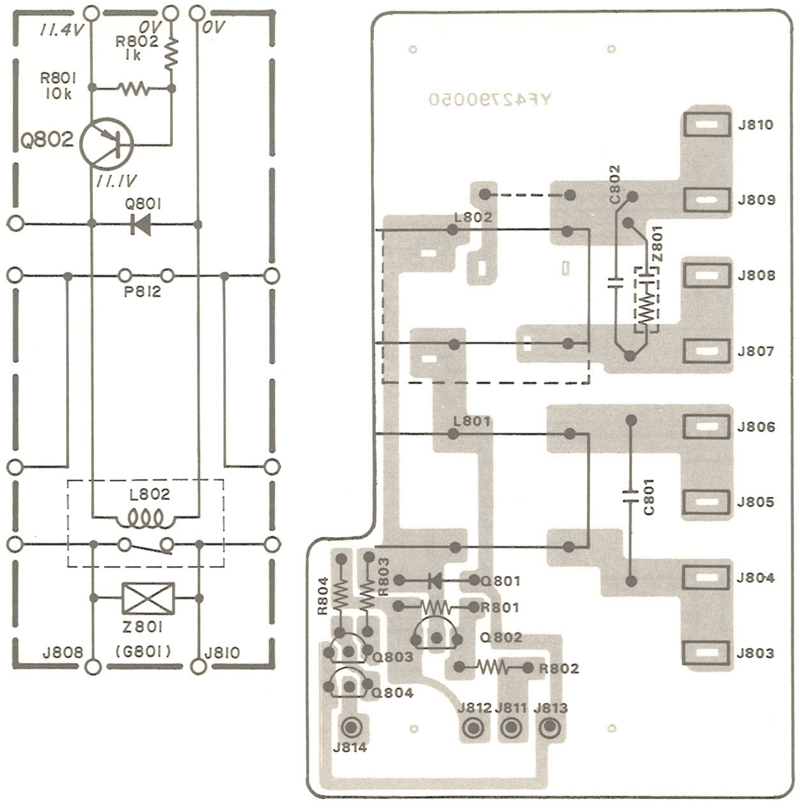
8.13 Safety Switch Assembly (PK32)
Schematic Diagram and Component Locations


PK32
S598
A
B
CENSOR STOP

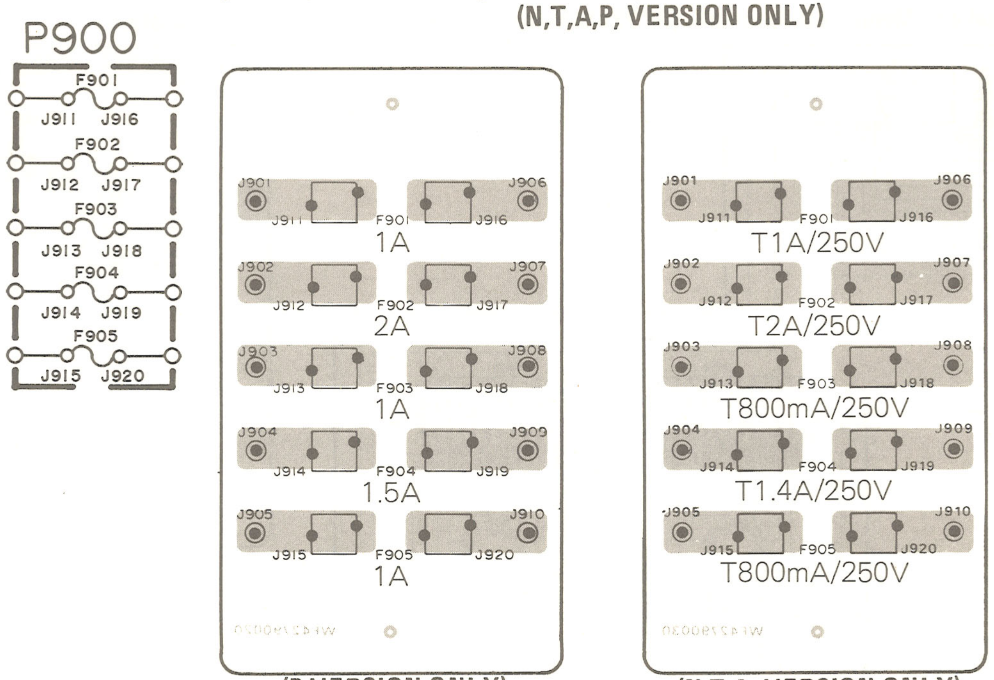
8.14 Safety Switch Assembly (PK33)
Schematic Diagram and Component Locations


PK33
S597
A
B
CENSOR STOP

8.15 Timer Relay Assembly (P800) Schematic Diagram and Component Locations


11.4V
0V
0V
R802 1k
R801 10k
Q802
11.1V
Q801
P812
L802
Z801
(G801)
J808
J810
L801
C801
C802
R803
R804
J803
J804
J805
J806
J807
J809
J811
J812
J813
J814
Q803
Q804

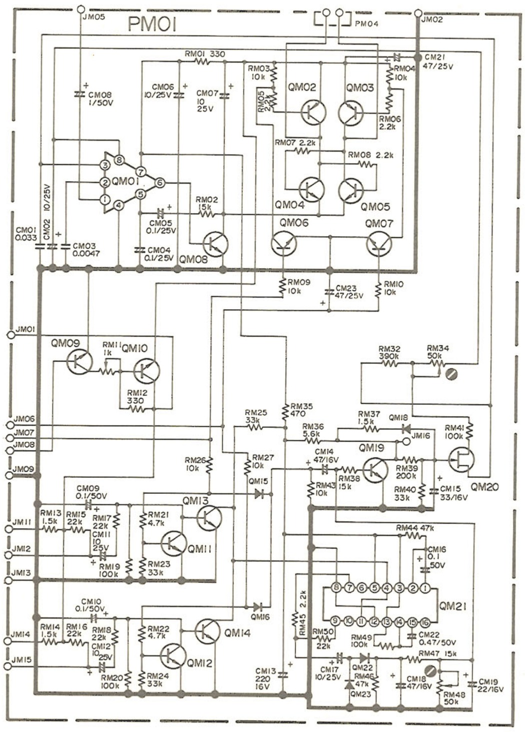
8.16 Fuse Assembly (P900) Schematic Diagram and Component Locations
(N,T,A,P, VERSION ONLY)

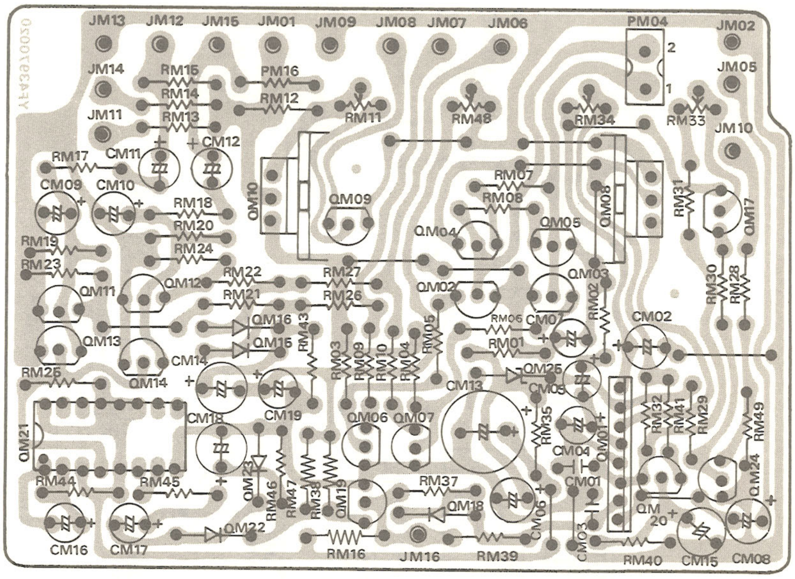

P900
F901
J911 J916
F902
J912 J917
F903
J913 J918
F904
J914 J919
F905
J915 J920
J901
J902
J903
J904
J905
J906
J907
J908
J909
J910
1A
2A
1A
1.5A
1A
T1A/250V
T2A/250V
T800mA/250V
T1.4A/250V
T800mA/250V

(P VERSION ONLY)

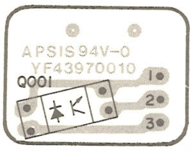
(N,T,A, VERSION ONLY)

8.17 Motor Governor Assembly (PM01) Schematic Diagram and Component Locations

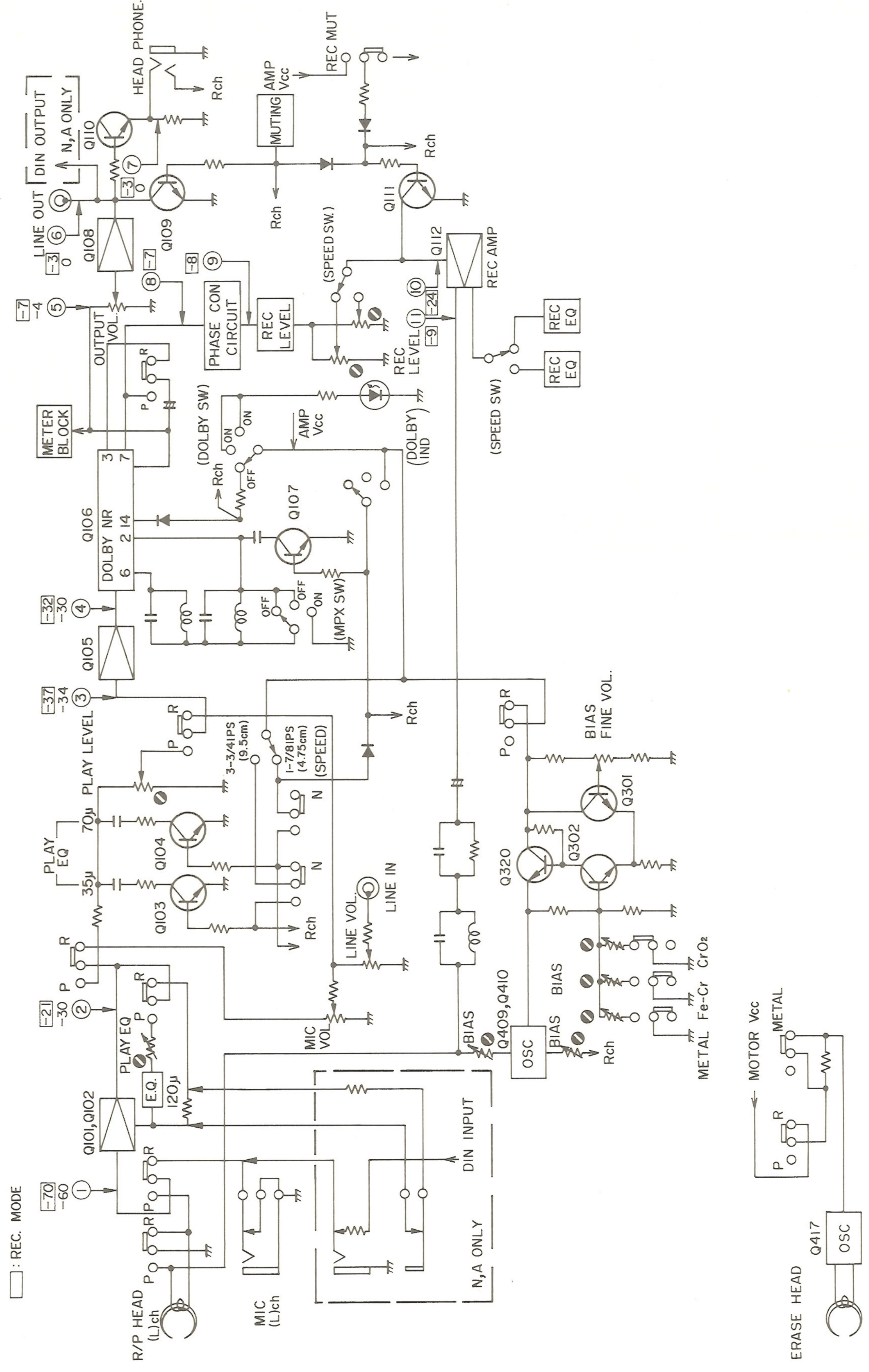

PM01
JM05
PM04
JM02
JM01
JM06
JM07
JM08
JM09
JM11
JM12
JM13
JM14
JM15
QM01
QM02
QM03
QM04
QM05
QM06
QM07
QM08
QM09
QM10
QM11
QM12
QM13
QM14
QM19
QM20
QM21
RM01 330
CM08 1/50V
CM06 10/25V
CM07 10 25V
CM21 47/25V
RM09 10k
RM10 10k
CM23 47/25V
RM32 390k
RM34 50k
RM11 1k
RM12 330


JM13
JM12
JM15
JM01
JM09
JM08
JM07
JM06
PM04
JM02
JM05
JM14
JM11
JM10
JM16
0520Y6E4Y
QM10
QM09
QM08
QM17
QM04
QM05
QM02
QM03
QM11
QM12
QM13
QM14
QM16
QM15
QM06
QM07
QM01
QM21
QM18
QM19
QM22
QM23
QM24
QM25
QM 20
CM01
CM02
CM03
CM04
CM05
CM06
CM07
CM08
CM09
CM10
CM11
CM12
CM13
CM14
CM15
CM16
CM17
CM18
CM19
RM01
RM02
RM03
RM04
RM05
RM06
RM07
RM08
RM09
RM10
RM11
RM12
RM13
RM14
RM15
PM16
RM16
RM17
RM18
RM19
RM20
RM21
RM22
RM23
RM24
RM25
RM26
RM27
RM28
RM29
RM30
RM31
RM32
RM33
RM34
RM35
RM37
RM38
RM39
RM40
RM41
RM43
RM44
RM45
RM46
RM47
RM48
RM49

8.18 Photo Coupler Assembly (P001) Component Locations

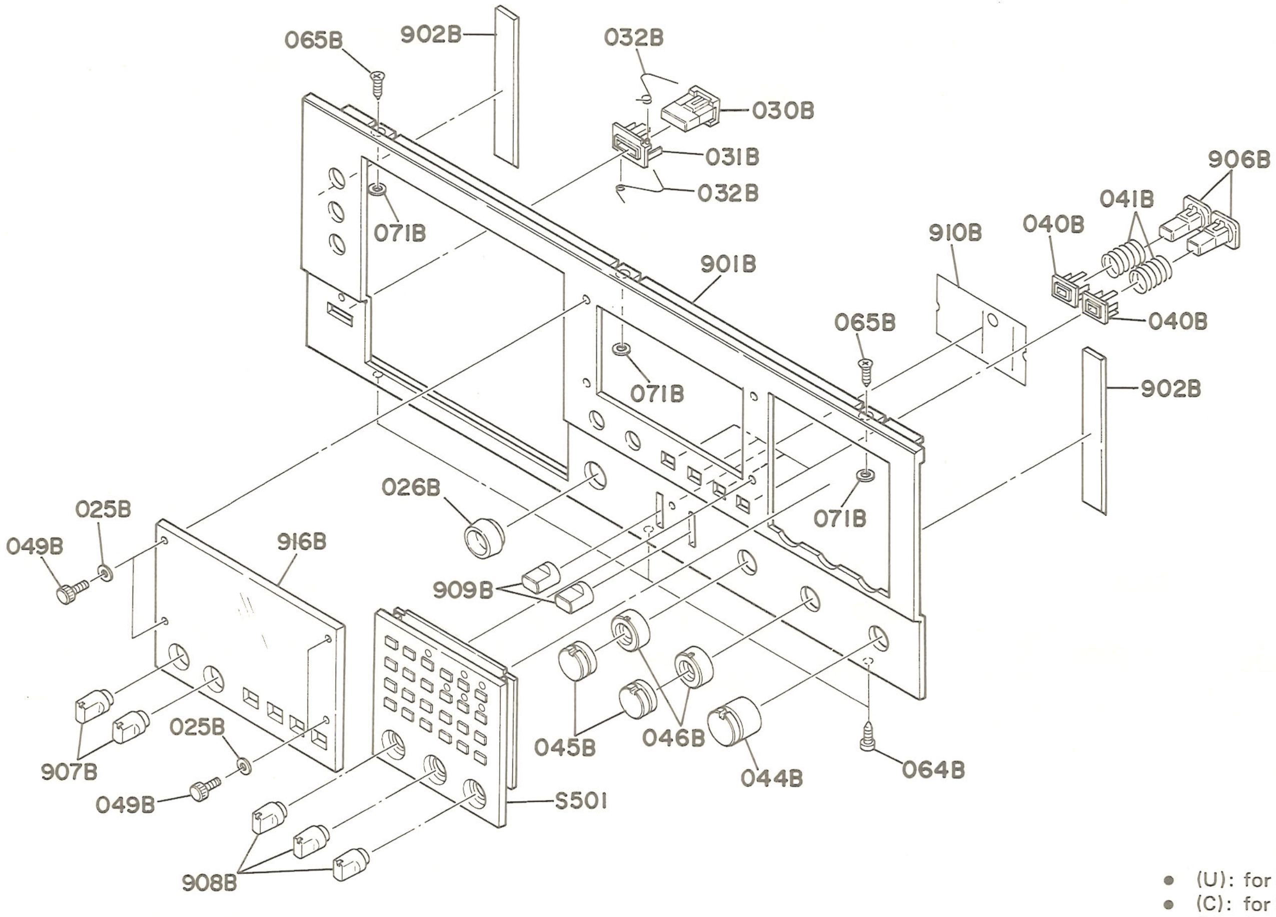

APSIS94V-0
YF43970010
Q001
1
2
3

9. BLOCK DIAGRAM


: REC. MODE
R/P HEAD (L)ch
MIC (L)ch
N,A ONLY
DIN INPUT
ERASE HEAD
Q417
OSC
MOTOR Vcc
METAL
P
R
-70
-60
①
Q101,Q102
E.Q.
120μ
PLAY EQ
-21
-30
②
35μ
PLAY EQ
70μ
Q103
Q104
PLAY LEVEL
-37
-34
③
Q105
-32
-30
④
Q106
DOLBY NR
6
2
14
3
7
Q107
(MPX SW)
ON
OFF
METER BLOCK
OUTPUT VOL.
-7
-4
⑤
⑧
-7
Q108
LINE OUT
-3
0
⑥
DIN OUTPUT
N,A ONLY
Q110
⑦
Q109
HEAD PHONE.
Rch
MUTING
AMP Vcc
REC MUT
-8
⑨
PHASE CON CIRCUIT
REC LEVEL
(SPEED SW.)
Q111
Q112
REC AMP
REC LEVEL
⑪
⑩
-9
-24
(SPEED SW)
REC EQ
REC EQ
(DOLBY SW)
ON
ON
OFF
AMP Vcc
(DOLBY IND)
3-3/4IPS (9.5cm)
1-7/8IPS (4.75cm)
(SPEED)
N
N
LINE VOL.
LINE IN
MIC VOL
BIAS
Q409,Q410
OSC
BIAS
BIAS
METAL
Fe-Cr
CrO₂
Q320
Q302
Q301
BIAS FINE VOL.

10. EXPLODED VIEW AND PARTS LIST

- **[P01-99] Front Panel**

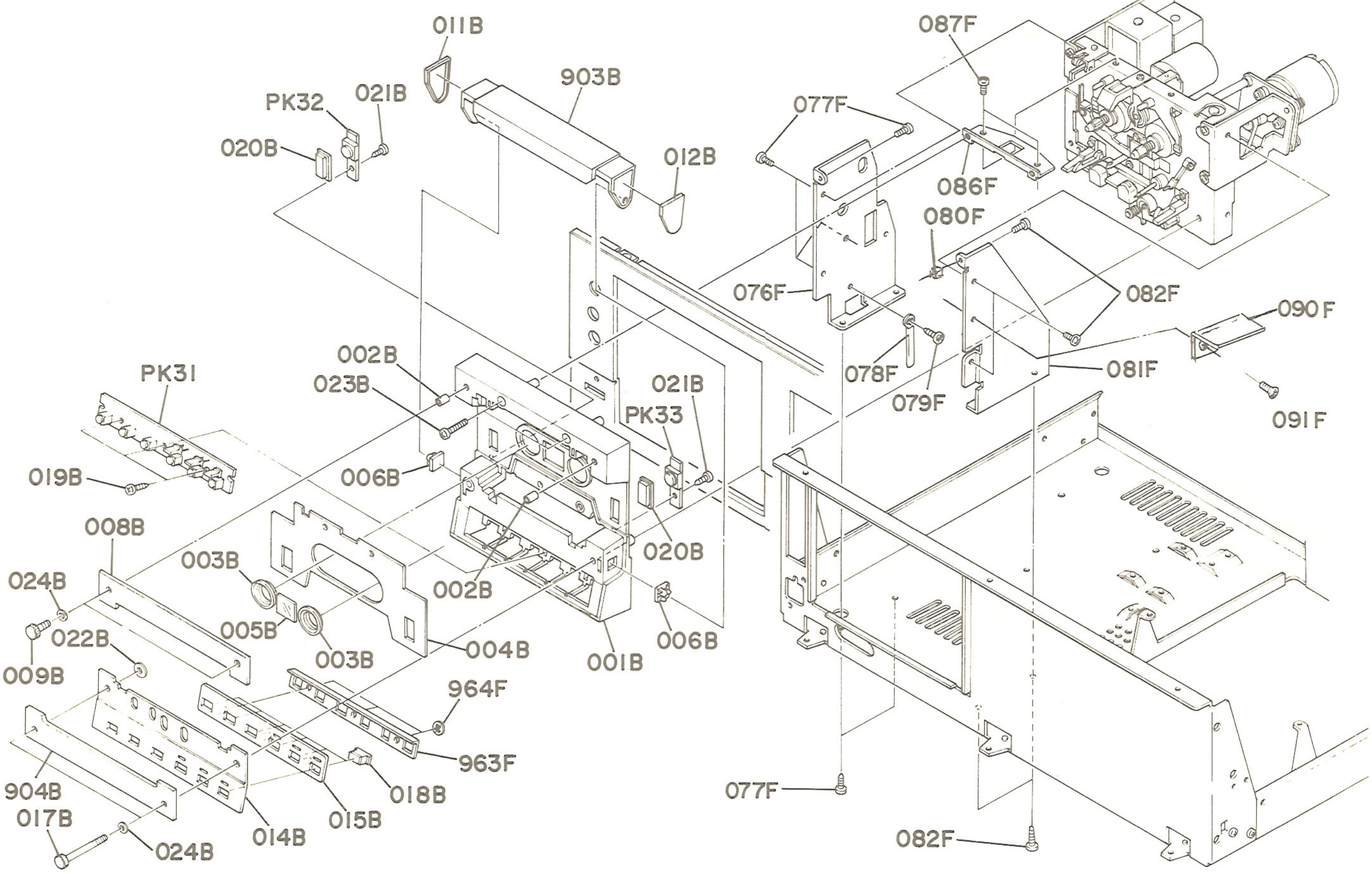

065B
902B
032B
030B
031B
032B
906B
071B
041B
910B
040B
901B
065B
040B
071B
902B
026B
025B
071B
049B
916B
909B
025B
045B
046B
064B
907B
044B
049B
S501
908B

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
A	1	1			4279063400	Front Panel Assembly
A1			1	1	4279063410	Front Panel Assembly
026B	1	1	1	1	4276259010	Bush, Rec Mute
031B	1	1	1	1	2127259010	Bush, Power Switch
040B	4	4	4	4	2112259030	Bush, Tape Selector
901B	1	1			4279063010	Escutcheon, Front Panel
901B			1	1	4279063020	Escutcheon, Front Panel
902B	2	2	2	2	4279118010	Spacer
910B	1	1	1	1	4280107010	Sheet, Lever Switch

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
025B	4	4	4	4	59046502G9	Washer
030B	1	1	1	1	2127154010	Knob, Power Switch
032B	2	2	2	2	2127115010	Spring
041B	4	4	4	4	2112115010	Spring
044B	1	1	1	1	4278154010	Knob, Output
045B	2	2	2	2	4278154020	Knob, Record
046B	2	2	2	2	4278154030	Knob, Record
049B	4	4	4	4	4279112020	Shaft, Meter Window
064B	3	3	3	3	51280306B0	B.H. Tapped Screw B3 x 6
065B	2	2	2	2	51500306B0	F.H. Taptite Screw F3 x 6
071B	3	3	3	3	59030808P0	Washer
906B	4	4	4	4	4279154010	Knob, Tape Selector
907B	2	2	2	2	4276154010	Knob, Speed/Bias
908B	3	3	3	3	4276154010	Knob
909B	2	2	2	2	2970154020	Knob, Lever Switch
916B	1	1	1	1	4279158010	Window, Dial
S501	1	1	1	1	SK10240010	Keyboard Switch

- **[P02-99] Associated Mechanism for Cassette Tape Operation**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963F
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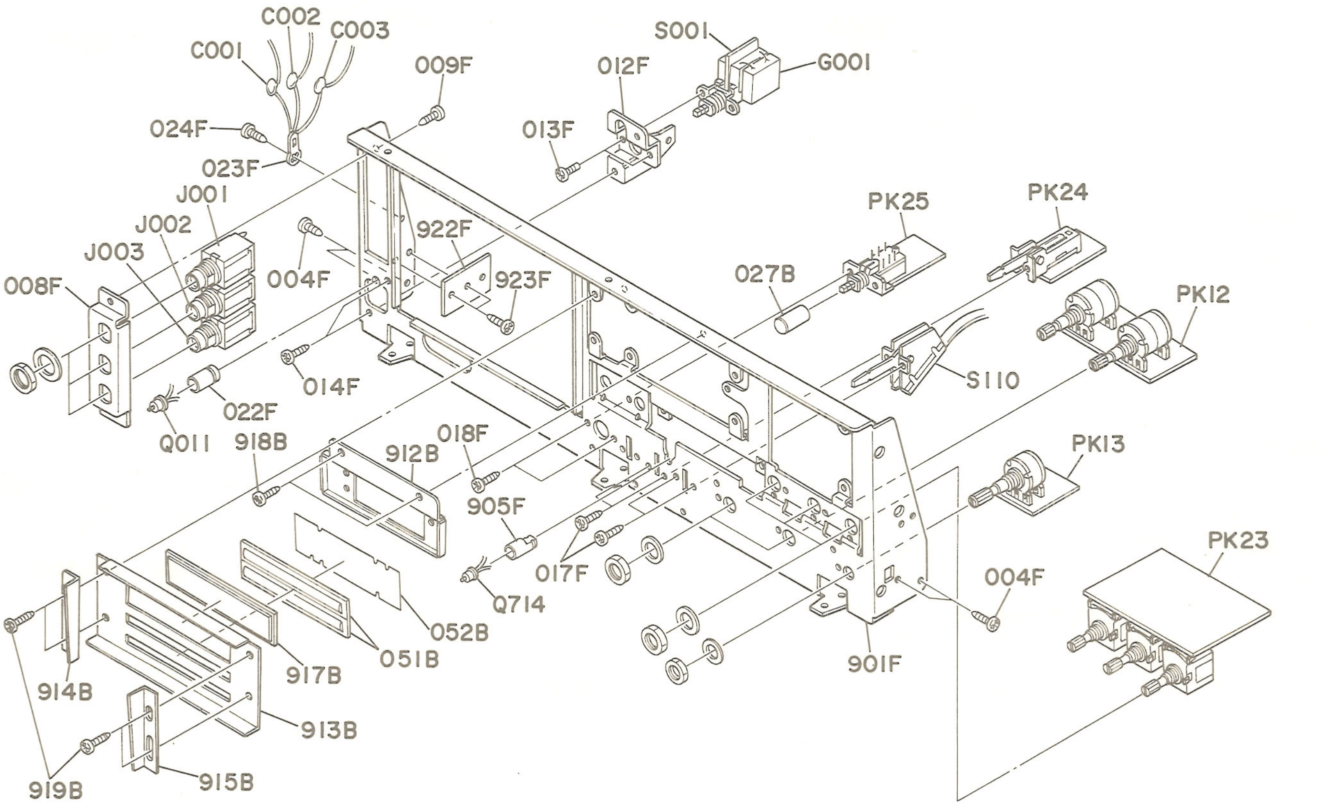
904B
017B
024B
014B
015B
077F
082F

- (U): for U.S.A.
- (N): for Europe
- (C): for Canada
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
B	1	1	1	1	4279053400	Cover Assembly
001B	1	1	1	1	4279053010	Cover, Mechanism
002B	2	2	2	2	65010306G0	Dodge Insert, S
003B	2	2	2	2	4279353010	Ring, Reel
004B	1	1	1	1	4279063050	Escutcheon, Cassette
005B	1	1	1	1	4279274010	Refrector
C	1	1	1	1	4279053410	Head Cover Assembly
011B	1	1	1	1	4279063060	Escutcheon, Head Cover (L)
012B	1	1	1	1	4279063070	Escutcheon, Head Cover (R)
903B	1	1	1	1	4279053020	Cover, Head
D	1	1	1	1	4279063420	Escutcheon Assembly
014B	1	1	1	1	4279063040	Escutcheon
015B	1	1	1	1	4279259010	Bush

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
006B	2	2	2	2	4279104010	Retainer
008B	1	1	1	1	4279063030	Escutcheon, Brand
009B	2	2	2	2	4279112020	Shaft
017B	2	2	2	2	4279112030	Shaft
018B	6	6	6	6	4279154020	Knob, Meca Button
019B	3	3	3	3	51282606B0	B.H. Tapped Screw B2.6 x 6
020B	2	2	2	2	4279154060	Knob, Senser
021B	2	2	2	2	51282606B0	B.H. Tapped Screw B2.6 x 6
022B	1	1	1	1	4280121010	Link
023B	2	2	2	2	52730312S9	H.S. Head Bolt 3 x 12
024B	4	4	4	4	59046502G9	Washer
904B	1	1	1	1	4279158050	Window, Azimuth Cover
076F	1	1	1	1	4279160040	Bracket (L)
077F	6	6	6	6	51280306B0	B.H. Tapped Screw B3 x 6
080F	1	1	1	1	59030805P0	Washer
081F	1	1	1	1	4279160050	Bracket (R)
082F	5	5	5	5	5128030680	B.H. Tapped Screw B3 x 6
086F	1	1	1	1	4279160160	Bracket
087F	2	2	2	2	51060303A9	P.H.M. Screw P3 x 3
090F	1	1	1	1	4279104020	Retainer
091F	1	1	1	1	51280308B0	B.H. Tapped Screw B3 x 6
963F	1	1	1	1	4280104010	Retainer
964F	3	3	3	3	64020300Q0	RG Ring, CS Type
078F	1	1	1	1	4220005030	Clamper
079F	1	1	1	1	51280306B0	B.H. Tapped Screw B3 x 6

- **[P03-99] Front Bracket**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PK12
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014F
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Q011
918B
912B
018F
PK13
905F
PK23
017F
004F
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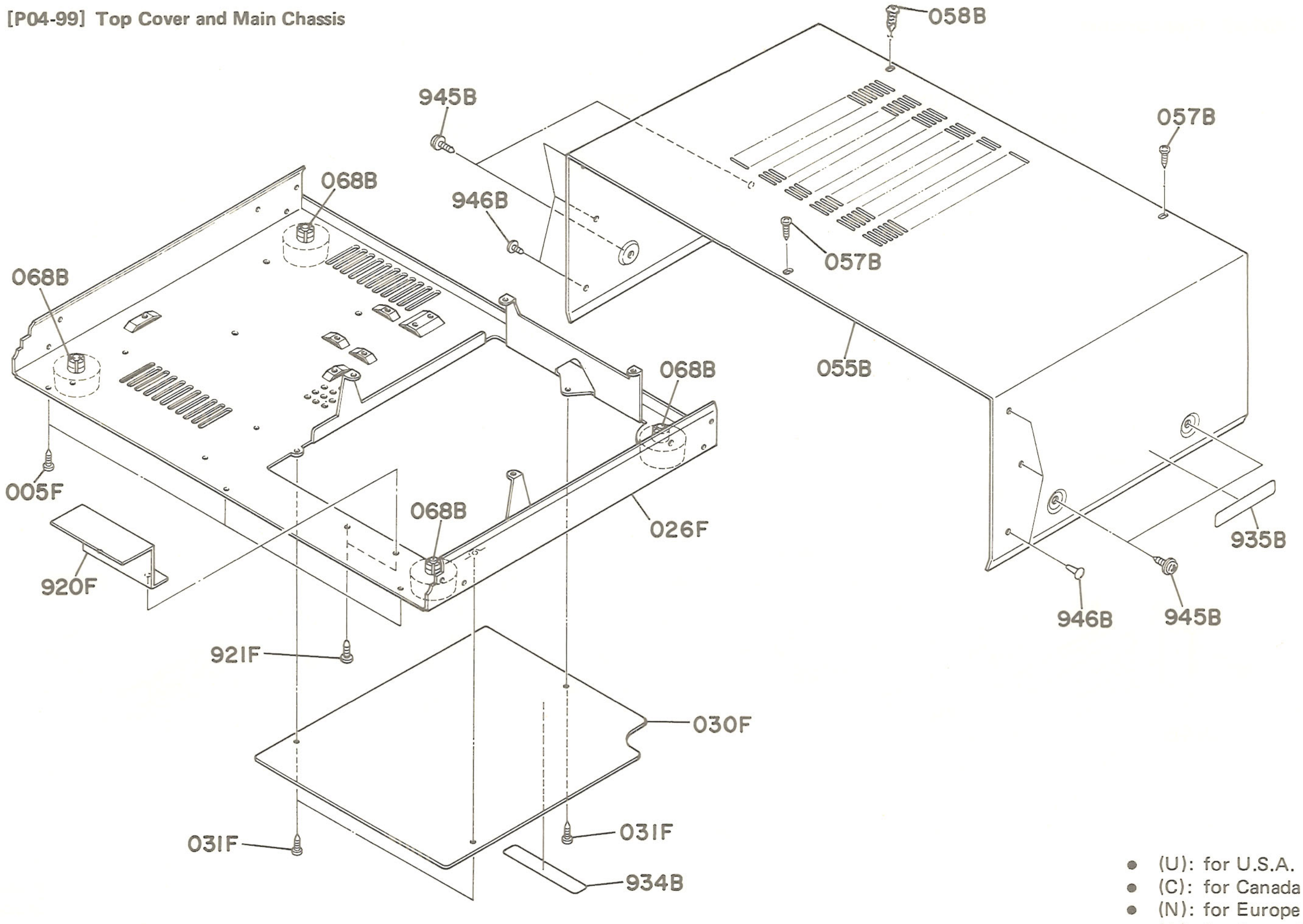
052B
051B
901F
917B
914B
913B
919B
915B

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
E	1	1	1	1	4279302400	Dial Assembly, LED
051B	2	2	2	2	2127355010	Lens, LED Meter
052B	1	1	1	1	2129303040	Mask, LED Lens
913B	1	1	1	1	4279302010	Dial, LED Meter
027B	1	1	1	1	4279154070	Knob, Rec Mute
912B	1	1	1	1	4279303010	Mask
914B	1	1	1	1	4279303020	Mask, Dial
915B	1	1	1	1	4279303030	Mask, Dial
917B	1	1	1	1	4279158030	Window, Counter
918B	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6
919B	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
004F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
008F	1	1	1	1	4279160130	Bracket, Jack
009F	1	1	1	1	51280306B0	B.H. Tapped Screw B3 x 6
012F	1	1	1	1	4279160140	Bracket, Power Switch
013F	2	2	2	2	51100306A9	B.H.M. Screw B3 x 6
014F	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6
017F	4	4	4	4	51100306A9	B.H.M. Screw B3 x 6
018F	2	2	2	2	51100306A9	B.H.M. Screw B3 x 6
022F	1	1	1	1	4279271010	Holder, LED
023F	1	1	1	1	62031650W0	Lug

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
024F	1	1	1	1	51280306B0	B.H. Tapped Screw B3 x 6
901F	1	1	1	1	4279160010	Bracket, Front Chassis
905F	1	1	1	1	4279271010	Holder, Timer LED
922F			1	1	4279120010	Insulator
923F			2	2	51280304B0	B.H. Tapped Screw B3 x 6
C001	1	1	1	1	DK18102300	Ceramic Cap, 0.001μF
C002	1	1	1	1	DK18102300	Ceramic Cap, 0.001μF
C003	1	1	1	1	DK18102300	Ceramic Cap, 0.001μF
⚠G001		1			BF33300020	Cap. Comp. Spark Killer
J001	1	1			YJ01001110	Jack, Mic (L)
J001			1	1	YJ01001120	Jack, Mic (L)
J002	1	1			YJ01001110	Jack, Mic (R)
J002			1	1	YJ01001120	Jack, Mic (R)
J003	1	1	1	1	YJ01001360	Jack, Head Phone
⚠S001	1	1			SP01010280	Push Switch, Power
⚠S001			1	1	SP02010440	Push Switch, Power
S110	1	1	1	1	SC00030030	Switch, 3 Position
Q011	1	1	1	1	HI10009300	L.E.D. Power
Q714	1	1	1	1	HI10009300	L.E.D. Timer Rec

- **[P04-99] Top Cover and Main Chassis**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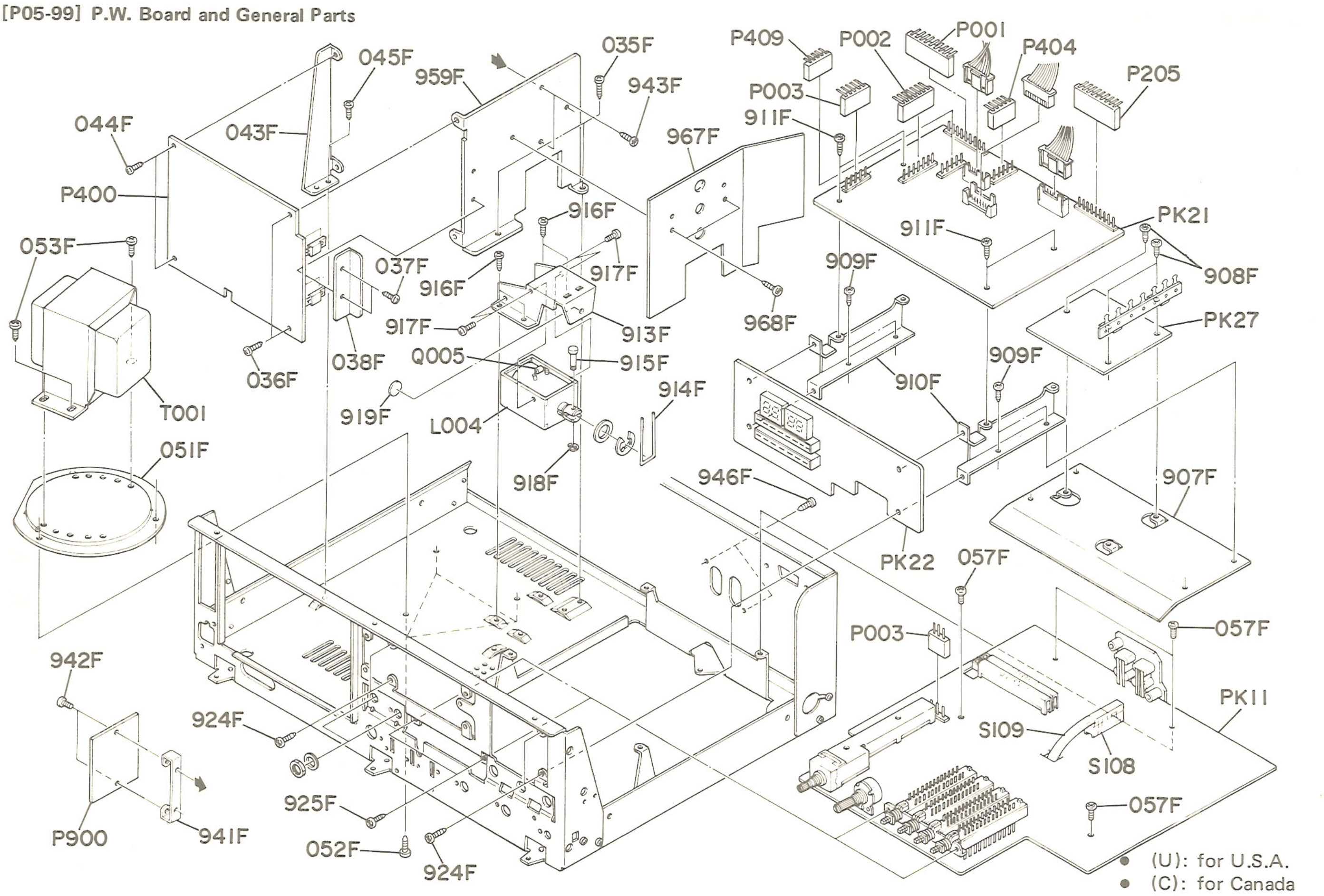
945B
921F
030F
031F
031F
934B

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION
055B	1	1	1	1	4279257010	Lid, Top Cover
057B	2	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
058B	1	1	1	1	51280305U0	B.H. Tapped Screw
068B	4	4	4	4	2259057010	Leg
934B	1		1	1	3889861010	Label
934B		1			4113861020	Label
935B	1		1	1	2932861010	Label
935B		1			2911861140	Label
945B	4	4	4	4	51480406S9	F. Washer Screw 4 x 6
946B	6	6	6	6	2991259010	Bushing

REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION
005F	3	3	3	3	51280306B0	B.H. Tapped Screw B3 x 6
026F	1	1	1	1	4279105010	Chassis
030F	1	1	1	1	4279257020	Lid
031F	3	3	3	3	51280306B0	B.H. Tapped Screw B3 x 6
920F	1	1	1	1	4279109030	Shield
921F	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6

- **[P05-99] P.W. Board and General Parts**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PK21
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909F
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913F
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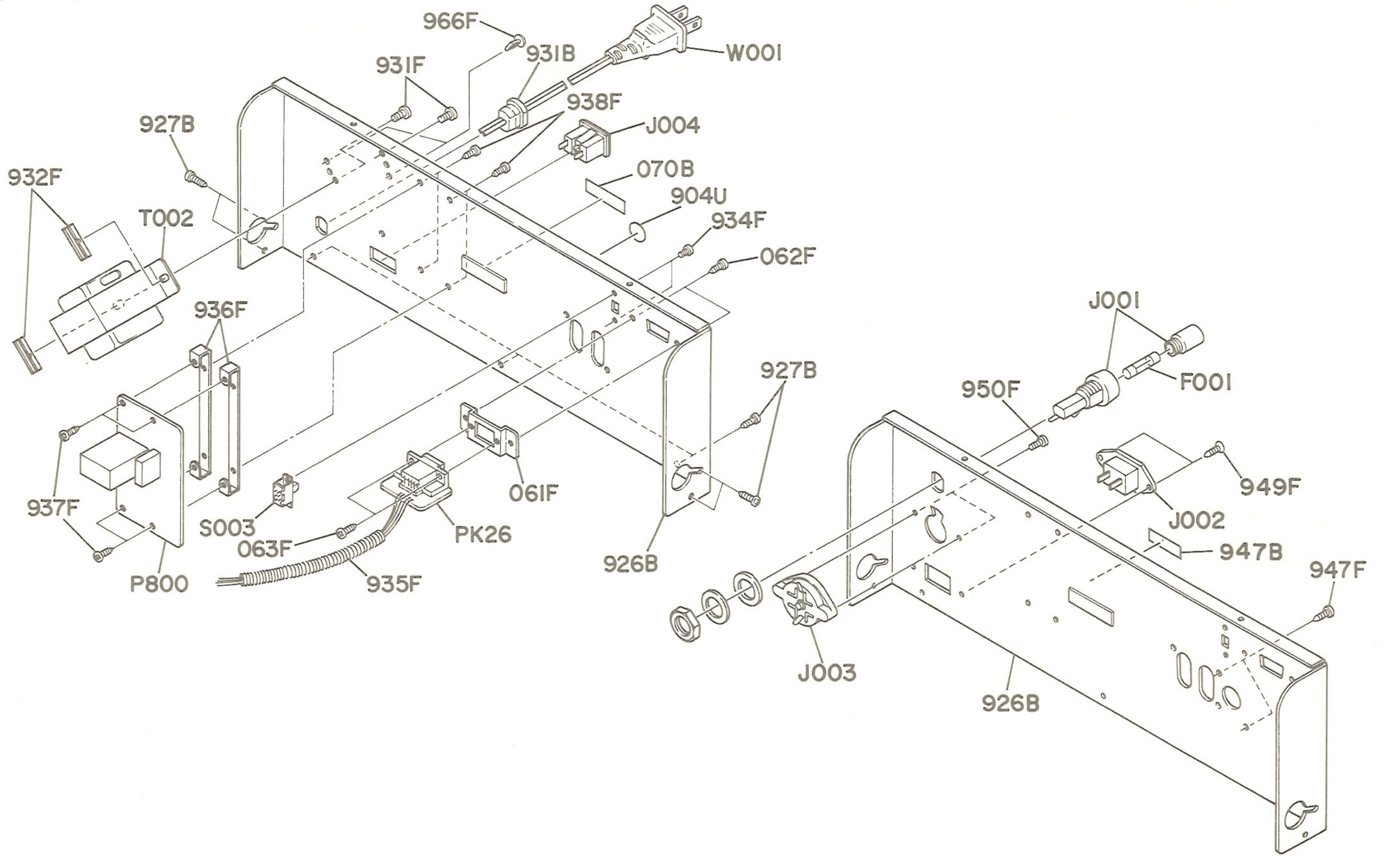
P900
941F
052F
924F

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
035F	2	2	2	2	51280308B0	B.H. Tapped Screw B3 x 8
036F	2	2	2	2	51280310B0	B.H. Tapped Screw B3 x 10
037F	2	2	2	2	51280310B0	B.H. Tapped Screw B3 x 10
038F	1	1	1	1	4279005010	Clamper
043F	1	1	1	1	4279160060	Bracket
044F	2	2	2	2	51280310B0	B.H. Tapped Screw B3 x 10
045F	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6
051F	1	1	1	1	4279160110	Bracket, Transf.
052F	3	3	3	3	51280406B0	B.H. Tapped Screw B4 x 6
053F	4	4	4	4	51280408B0	B.H. Tapped Screw B4 x 8
057F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
907F	1	1	1	1	4279109020	Shield
908F	3	3	3	3	51280306B0	B.H. Tapped Screw B3 x 6
909F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
910F	2	2	2	2	4279160080	Bracket
911F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
913F	1	1	1	1	4279160070	Bracket, Solenoid
914F	1	1	1	1	4279115020	Spring, Rec
915F	1	1	1	1	4279112010	Shaft
916F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
917F	4	4	4	4	51100305A9	B.H.M. Screw B3 x 5
918F	1	1	1	1	64000200R0	RG Ring, E Type
919F	1	1	1	1	4279056010	Buffer
924F	4	4	4	4	51280306B0	B.H. Tapped Screw B3 x 6
925F	2	2	2	2	51100306A9	B.H.M. Screw B3 x 6
941F			1	1	3890160040	Bracket

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
942F			2	2	51100306A9	B.H.M. Screw B3 x 6
943F			2	2	51100306A9	B.H.M. Screw B3 x 6
946F	2	2	2	2	51280308U0	B.H. Tapped Screw B3 x 8
959F	1	1	1	1	4279267020	Heat Sink
L004	1	1	1	1	ME10630010	Solenoid Coil, Rec
Q005	1	1	1	1	HD20023100	Diode 10E-1
S108	1	1	1	1	SS04030130	Slide Switch
S109	1	1	1	1	SB11910010	Switch Band, FLX
⚠T001	1	1			TS16621010	Power Transformer
⚠T001			1	1	TS16621020	Power Transformer
P001	1	1	1	1	YJ06001430	Jack (9P)
P002	1	1	1	1	YJ06001260	Jack (7P)
P003	1	1	1	1	YJ06001040	Jack (3P)
P003	1	1	1	1	YJ06001250	Jack (5P)
P205	1	1	1	1	YJ06001070	Jack (9P)
P404	1	1	1	1	YJ06001250	Jack (5P)
P409	1	1	1	1	YJ06001250	Jack (5P)
967F	1	1	1	1	4279109050	Shield
968F	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6

- **[P06-99] Rear Panel**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J001
927B
F001
950F
949F
937F
061F
J002
S003
063F
PK26
947B
947F
926B
P800
935F
J003
926B

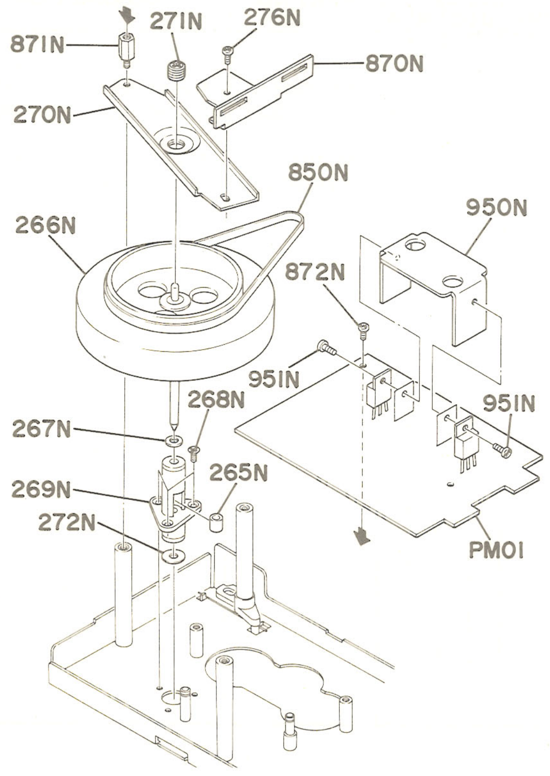
- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
070B	1	1	1	1	2112265010	Indicator, Serial No.
926B	1	1			4279160020	Bracket, Rear Panel
926B			1	1	4279160030	Bracket, Rear Panel
927B	7	7	7	7	51280306U0	B.H. Tapped Screw B3 x 6
931B	1	1			1455259030	Bushing
947B			1	1	4581861010	Label
061F	1	1	1	1	4279160120	Bracket, Remote Jack
062F	2	2	2	2	51280306U0	B.H. Tapped Screw B3 x 6
063F	2	2	2	2	51280306B0	B.H. Tapped Screw B3 x 6
931F	2	2	2	2	51100408S9	B.H.M. Screw B4 x 8
932F	2	2	2	2	2922005010	Clamper
934F	2	2	2	2	51100203S0	B.H.M. Screw B2 x 3
935F	1	1	1	1	4279109040	Shield
936F	2	2	2	2	3889160090	Bracket
937F	4	4	4	4	51100306A9	B.H.M. Screw B3 x 6
938F	4	4	4	4	51100306S9	B.H.M. Screw B3 x 6
947F			2	2	51280308U0	B.H. Tapped Screw B3 x 8
949F			2	2	51500308U0	F.H. Taptite Screw F3 x 8
950F			2	2	51280310U0	B.H. Tapped Screw B2 x 10
966F	2	2	2	2	74420029G0	Hole Plug
967F	1	1	1	1	4279109050	Shilde
968F	2	2	2	2	51280306B0	B.H. Tapped Screw

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
904U	1				9511101070	Label, UL
904U		1			2457861040	Label, CSA
⚠J001			1	1	YJ08000290	Jack, Fuse Holder
⚠J002			1	1	YP04000610	Plug, AC Inlet
⚠J003			1	1	BY05080010	Voltage Selector
⚠J004	1	1			YJ04000560	Jack, AC Outlet
S003	1	1	1	1	SS02020610	Slide Switch
⚠T002	1	1			TS15406240	Power Transformer
⚠T002			1	1	TS15406250	Power Transformer
⚠W001	1	1			YC02000140	A.C. Power Cord
⚠F001			1	1	FS10080800	Fuse 0.8A

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

[P07-99] Flywheel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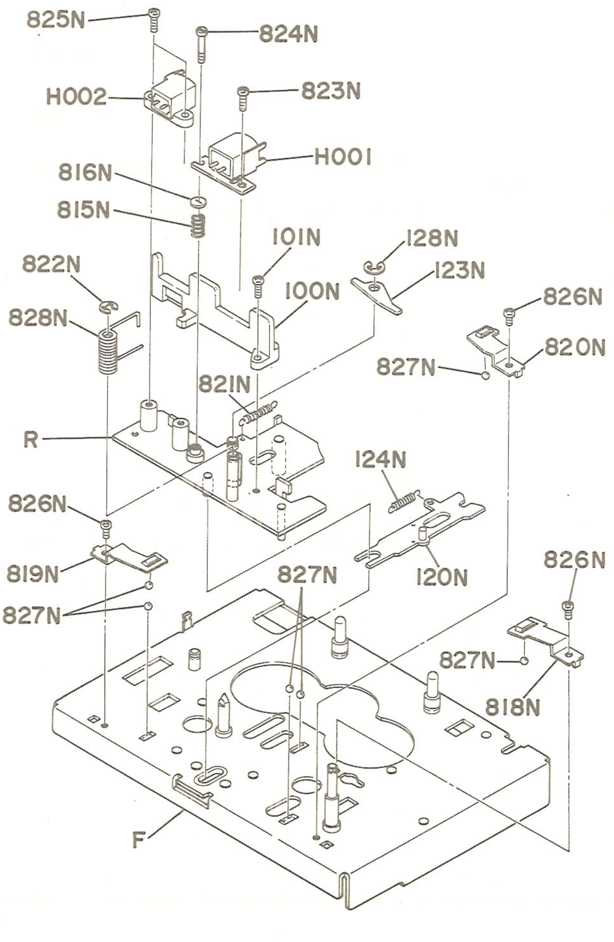
272N
PM01

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
Q	1	1	1	1	4397106400	Sustainer Assembly
265N	1	1	1	1	4397262030	Collar
266N	1	1	1	1	4397273500	Flywheel (K)
267N	1	1	1	1	59030802G9	Spacer
269N	1	1	1	1	4397106020	Sustainer, Capstan
268N	3	3	3	3	51042604A0	F.H.M. Screw F2.6 x 4
270N	1	1	1	1	4397104010	Retainer
271N	1	1	1	1	3483164020	Adjuster
272N	1	1	1	1	4397118010	Spacer
276N	1	1	1	1	51060305A9	P.H.M. Screw P3 x 5
850N	1	1	1	1	4397264010	Belt
870N	1	1	1	1	4397104050	Retainer
871N	1	1	1	1	2838101010	Support
872N	1	1	1	1	51060304A9	P.H.M. Screw P3 x 4
950N	1	1	1	1	4397267010	Heatsink
951N	2	2	2	2	50060305B9	Screw 3 x 5

[P08-99] Head Chassis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R
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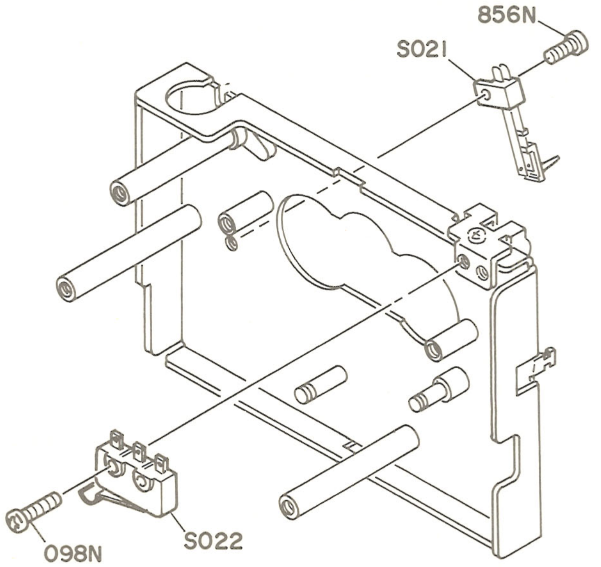
826N
819N
827N
120N
826N
827N
827N
818N
F

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
F	1	1	1	1	4397105400	Chassis Assembly
R	1	1	1	1	4397105410	Chassis Assembly, Head
100N	1	1	1	1	4397053010	Cover, Head Chassis
101N	1	1	1	1	51060206A0	P.H.M. Screw P2 x 6
120N	1	1	1	1	4397354500	Lever, (K) F/R
123N	1	1	1	1	4397002050	Arm, F/R
124N	1	1	1	1	4397115190	Spring
128N	1	1	1	1	64002500R0	RG Ring, E Type
815N	1	1	1	1	4380115090	Spring, Azimuth
816N	1	1	1	1	3444118070	Spacer
818N	1	1	1	1	4397115070	Spring
819N	1	1	1	1	4397115080	Spring (L)
820N	1	1	1	1	4397115090	Spring (R)
821N	1	1	1	1	4397115130	Spring
822N	1	1	1	1	64002500R0	RG Ring, E Type
823N	1	1	1	1	51060204A0	P.H.M. Screw P2 x 4
824N	1	1	1	1	4397254090	Pin
825N	2	2	2	2	51060206A0	P.H.M. Screw P2 x 6
826N	3	3	3	3	51062603A0	P.H.M. Screw P2.6 x 3
827N	6	6	6	6	61025010T0	Ball
828N	1	1	1	1	4397115050	Spring
H001	1	1	1	1	LH42102020	Rec/Play Head
H002	1	1	1	1	LH31000480	Erase Head

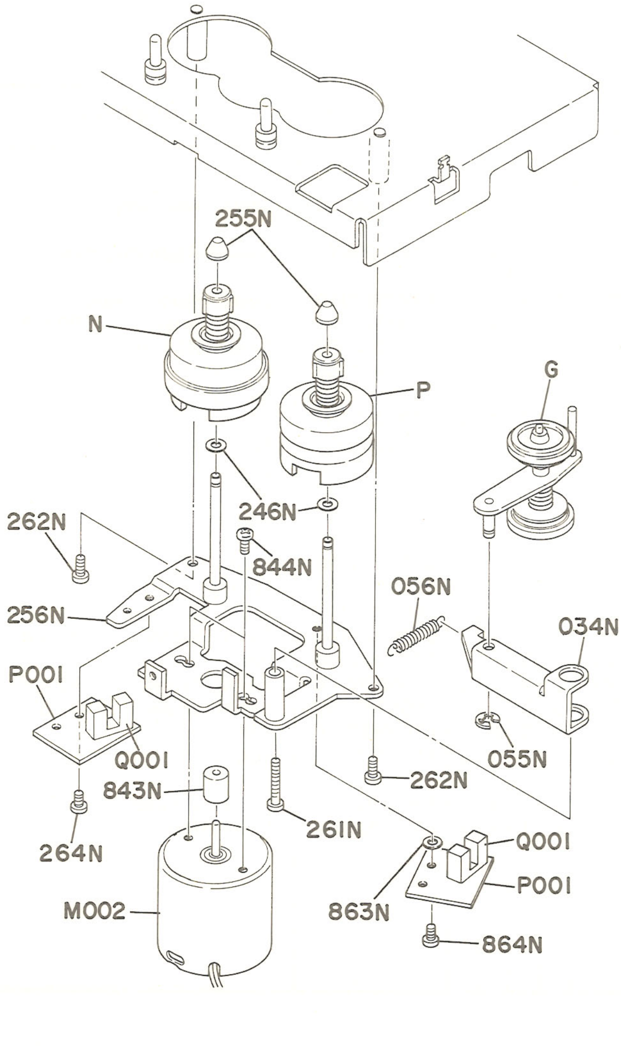
- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

- **[P09-99] Switch Location**



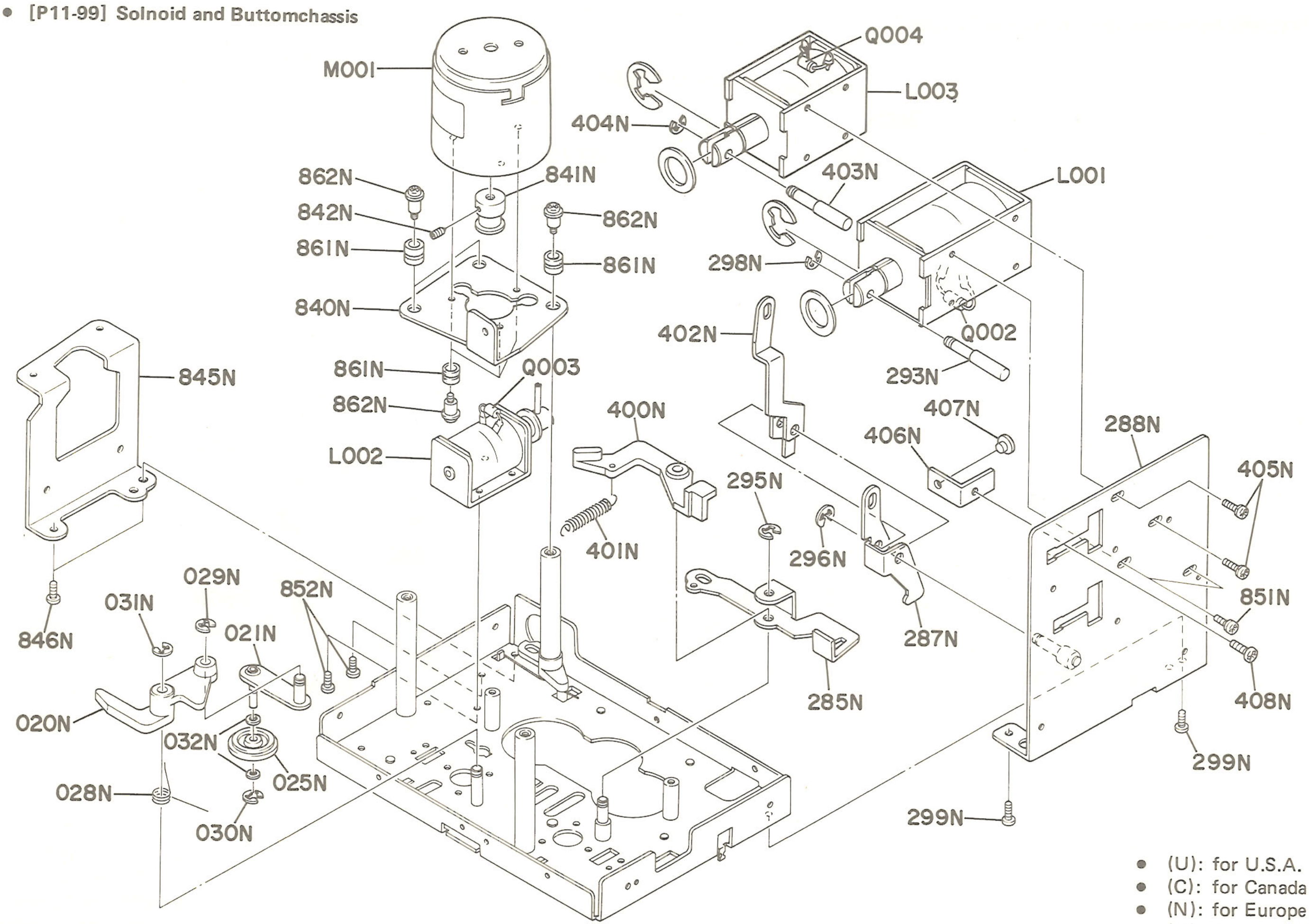
REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
098N	1	1	1	1	51060208A0	P.H.M. Screw P2 x 8
856N	1	1	1	1	51062605A0	P.H.M. Screw P2.6 x 5
S021	1	1	1	1	SM01010740	Mini Switch, Cassette
S022	1	1	1	1	SC01020340	Micro Switch

- **[P10-99] Pulley**



REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
G	1	1	1	1	4397002420	Arm Assembly, FF/REW
N	1	1	1	1	4397004400	Table Assembly, Take up
P	1	1	1	1	4397004420	Table Assembly, Supply
034N	1	1	1	1	4397354150	Lever, F/R
055N	1	1	1	1	64002500R0	RG Ring, E Type
056N	1	1	1	1	4397115010	Spring
246N	2	2	2	2	59020402G9	Washer
255N	2	2	2	2	4367067010	Cap, Reel Table
256N	1	1	1	1	4397160500	Bracket (K) Reel
261N	1	1	1	1	51062620A0	P.H.M. Screw P2.6 x 20
262N	2	2	2	2	51062606A0	P.H.M. Screw P2.6 x 6
264N	1	1	1	1	51062604A0	P.H.M. Screw P2.6 x 4
843N	1	1	1	1	4397262020	Pulley, Reel Motor
844N	2	2	2	2	51062603A0	P.H.M. Screw P2.6 x 3
863N	1	1	1	1	54110159A0	Flat Washer, L.
864N	1	1	1	1	51062604A0	P.H.M. Screw P2.6 x 4
⚠M002	1	1	1	1	MM01200080	D.C. Motor, FF/REW
Q001	2	2	2	2	HW10001030	Photo Unit
P001	2	2	2	2	YF43970010	P.W. Board, Photo Coupler
	2	2	2	2	ZZ43970010	P.W. Board Assembly

- **[P11-99] Solnoid and Buttomchassis**

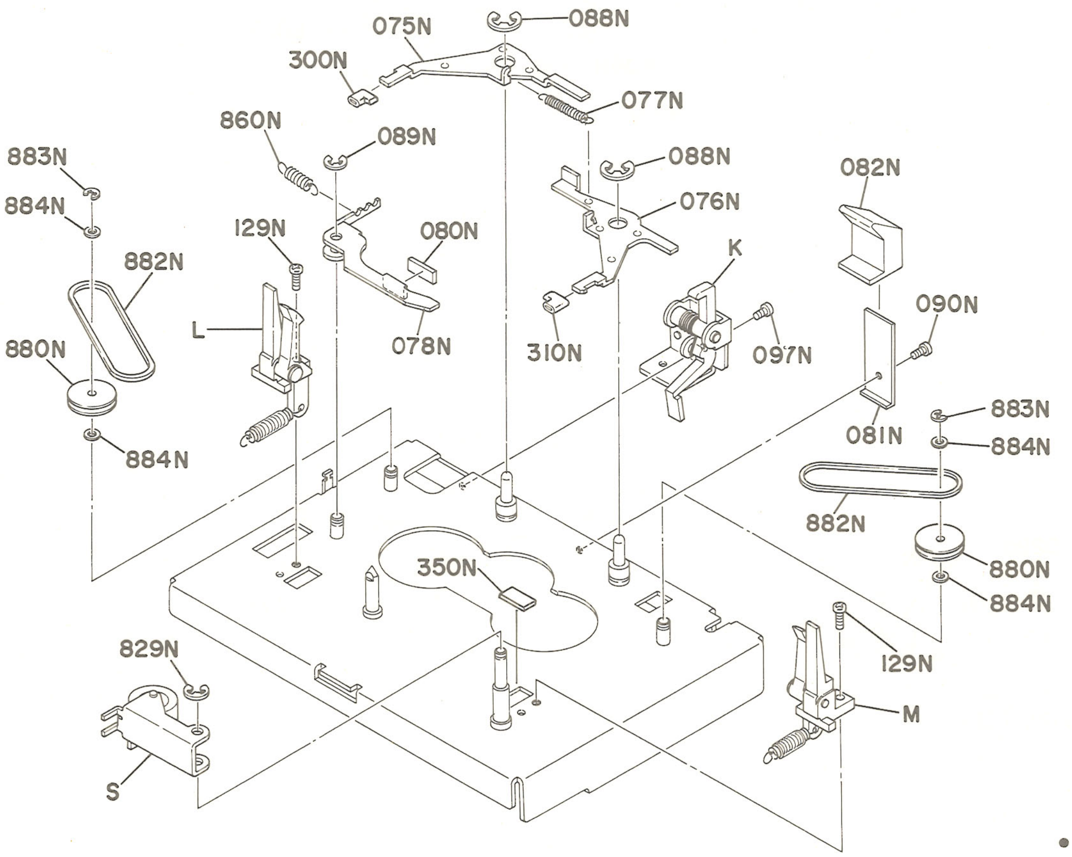

M001
Q004
L003
404N
403N
L001
862N
841N
842N
862N
861N
861N
298N
840N
Q002
402N
293N
845N
861N
Q003
862N
400N
407N
288N
406N
L002
405N
295N
296N
401N
029N
852N
851N
031N
021N
287N
846N
408N
285N
020N
032N
025N
299N
028N
030N
299N

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION	
020N	1	1	1	1	4397354080	Lever, Take up	
021N	1	1	1	1	4397002500	Arm (K) Take up	
025N	1	1	1	1	4397001510	Idler, Take up	
028N	1	1	1	1	4397115150	Spring	
029N	1	1	1	1	64000200R0	RG Ring, E Type	
030N	1	1	1	1	64001200R0	RG Ring, E Type	
031N	1	1	1	1	64002500R0	RG Ring, E Type	
032N	2	2	2	2	59163202G9	Washer	
285N	1	1	1	1	4397354070	Lever, Play	
287N	1	1	1	1	4397354060	Lever, Solenoid	
288N	1	1	1	1	4397160510	Bracket (K)	
293N	1	1	1	1	4397254080	Pin	
295N	1	1	1	1	64000300R0	RG Ring, E Type	
296N	1	1	1	1	64000300R0	RG Ring, E Type	
298N	1	1	1	1	64002500R0	RG Ring, E Type	
299N	2	2	2	2	51100306A9	B.H.M. Screw	B3 x 6
400N	1	1	1	1	4397354110	Lever	
401N	1	1	1	1	4397115170	Spring	
402N	1	1	1	1	4397354120	Lever	
403N	1	1	1	1	4397254130	Pin	
404N	1	1	1	1	64002500R0	RG Ring, E Type	
405N	2	2	2	2	51440306A9	L. Washer Screw	L3 x 6
406N	1	1	1	1	4397114010	Stopper	
407N	1	1	1	1	3312056030	Buffer	
408N	1	1	1	1	51100405A9	B.H.M. Screw	B4 x 5

REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION	
840N	1	1	1	1	4397160020	Bracket, Motor	
841N	1	1	1	1	4397262010	Pulley	
842N	1	1	1	1	51690305Q9	Socket Screw, HP	3 x 5
845N	1	1	1	1	4397160060	Bracket, Motor	
846N	2	2	2	2	51060304A9	P.H.M. Screw	P3 x 4
851N	2	2	2	2	51440306A9	L. Washer Screw	L3 x 6
852N	2	2	2	2	51102604A0	B.H.M. Screw	B2.6 x 4
861N	6	6	6	6	4383259010	Bushing	
862N	6	6	6	6	4367112150	Shaft	
⚠ L001	1	1	1	1	ME10630010	Solenoid Coil, Play	
⚠ L002	1	1	1	1	ME10410010	Solenoid Coil, Brake	
⚠ L003	1	1	1	1	ME10510010	Solenoid Coil, CUE/REV	
⚠ M001	1	1	1	1	MM11205010	D.C. Motor, 12V 2 Speed	
Q002	1	1	1	1	HD20023100	Diode 10E-1	
Q003	1	1	1	1	HD20023100	Diode 10E-1	
Q004	1	1	1	1	HD20023100	Diode 10E-1	

• [P12-99] Parts Assembly on the Top Chassis


075N
088N
300N
077N
860N
089N
883N
088N
082N
884N
076N
129N
080N
882N
K
090N
L
880N
078N
310N
097N
883N
081N
884N
884N
882N
350N
880N
884N
829N
129N
M
S

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
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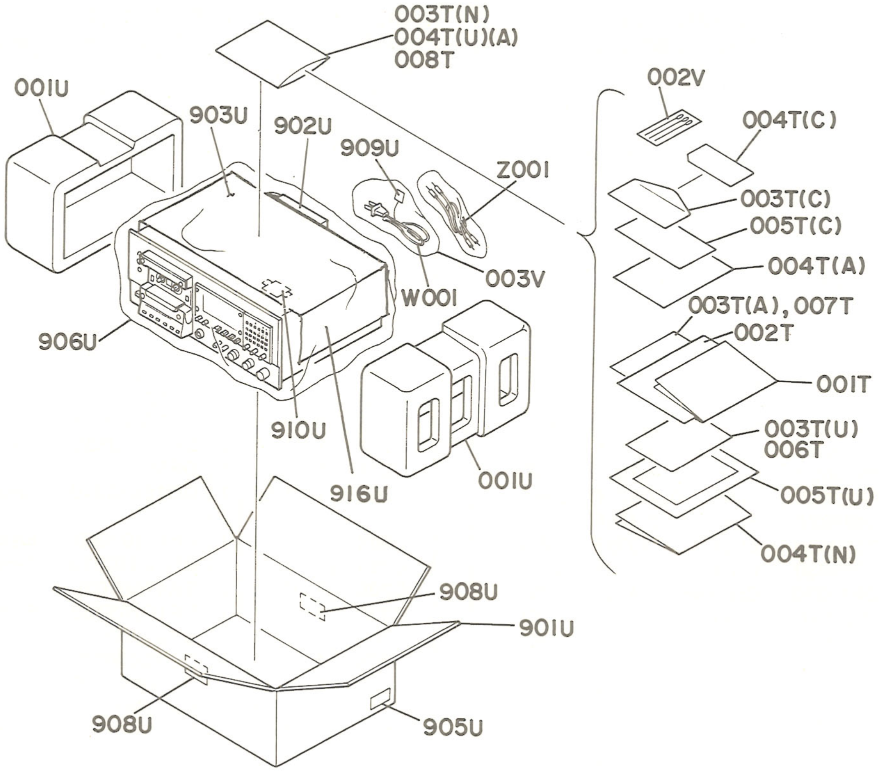
REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
K	1	1	1	1	4397104420	Retainer Assembly
L	1	1	1	1	4397104400	Retainer Assembly, Cassette
M	1	1	1	1	4397104410	Retainer Assembly, Cassette
S	1	1	1	1	4397354410	Lever Assembly, Pinch Roller
075N	1	1	1	1	4397354040	Brake Lever (L)
076N	1	1	1	1	4397354030	Brake Lever (R)
077N	1	1	1	1	4397115100	Spring
078N	1	1	1	1	4397354090	Lever, Back Tension
080N	1	1	1	1	4397061030	Clutch, Back Tension
081N	1	1	1	1	4397115020	Spring
082N	1	1	1	1	4397053020	Cover
088N	2	2	2	2	64000400R0	RG Ring, E Type
089N	1	1	1	1	64002500R0	RG Ring, E Type

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
090N	1	1	1	1	51062603A0	P.H.M. Screw P2.6 x 3
097N	1	1	1	1	51062604A0	P.H.M. Screw P2.6 x 4
300N	1	1	1	1	4367263010	Brake
301N	1	1	1	1	4367263010	Brake
350N	1	1	1	1	4397120010	Insulator
829N	1	1	1	1	64002500R0	RG Ring, E Type
860N	1	1	1	1	4397115210	Spring, Back Tension
880N	2	2	2	2	4397262040	Pulley
882N	2	2	2	2	4397264020	Belt
883N	2	2	2	2	64001500R0	RG Ring, E Type
884N	4	4	4	4	59020402G9	Washer
129N	2	2	2	2	51062606A0	P.H.M. Screw P2.6 x 6

- **[H01-99] Packing Materials**


003T(N)
004T(U)(A)
008T
001U
903U
902U
909U
Z001
002V
004T(C)
003T(C)
005T(C)
004T(A)
003T(A), 007T
002T
001T
003T(U)
006T
005T(U)
004T(N)
003V
W001
906U
910U
916U
001U
908U
901U
908U
905U

- (U): for U.S.A.
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- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
001T	1	1		1	4279851210	Instructions
001T			1		4279351310	Instructions
002T	1	1		1	4279851220	Instructions
002T			1		4279851030	Instructions
003T	1				2818854020	Guarantee Card
003T		1			2918813010	Envelope
003T			1		9013025010	Polyethy Bag
003T				1	2205851040	Instructions
004T	1			1	9013025010	Polyethy Bag
004T		1			9630000180	Guarantee Card
004T			1		4279856010	Circuit Diagram
004T				1	9631000090	Guarantee Card
005T	1				2225813010	Envelope
005T		1			9650000050	S. Station Card
006T		1			2818854040	Guarantee Card
007T		1			4292851220	Instructions
008T		1			9013025010	Polyethy Bag

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
001U	2	2	2	2	4279809010	Cushion
901U	1	1			4279801010	Packing Case
901U			1	1	4279801030	Packing Case
902U	1	1			2864804010	Sleeve
903U	1	1	1	1	2918107150	Sheet
905U	2				9526019010	Serial No. Card
905U		2			9526019020	Serial No. Card
905U			2	2	9526019030	Serial No. Card
906U	1	1	1	1	9090909040	Polyethy Sheet
908U		2			9510901020	Label, Address
909U			1	1	9560000040	Hang Tag
910U			1		2731821010	Silicagel
916U	1	1	1	1	2918107320	Sheet
002V	1	1	1	1	4136071010	Cleaner
003V	1	1	1	1	9011325010	Polyethy Bag
⚠W001			1		ZC01805020	A.C. Power Cord
⚠W001				1	ZC02006030	A.C. Power Cord
Z001	2	2	2	2	ZD01000170	Connective Cord

- (U): for U.S.A.
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- (A): for Australia

11. ELECTRICAL PARTS LIST

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						PK11-PRE-AMP. CIRCUIT BOARD
PK11	1	1	1	1	YK42791310	P.W. Board, Pre-Amp.
	1	1	1	1	ZZ42791310	P.W. Board Assembly
						PK11-CAPACITORS
C101	1	1	1	1	DF55271090	Film 270pF ±5%
C102	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C103	1	1	1	1	EE10601640	Elect 10μF 16V
C104	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C105	1	1	1	1	EA47601030	Elect 47μF 10V
C106	1	1	1	1	DF15153300	Film 0.015μF ±5%
C107	1	1	1	1	EA22602530	Elect 22μF 25V
C108	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C109	1	1	1	1	EA10602530	Elect 10μF 25V
C110	1	1	1	1	EA22505030	Elect 2.2μF 50V
C111	1	1	1	1	DF15123300	Film 0.012μF ±5%
C112	1	1	1	1	DF15102300	Film 0.001μF ±5%
C113	1	1	1	1	EA33405030	Elect 0.33μF 50V
C114	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C115	1	1	1	1	EA33405030	Elect 0.33μF 50V
C116	1	1	1	1	EA10702530	Elect 100μF 25V
C117	1	1	1	1	EA10505030	Elect 1μF 50V
C118	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C119	1	1	1	1	EE10505040	Elect 1μF 50V
⚠C120	1	1	1	1	EA10702530	Elect 100μF 25V
C121	1	1	1	1	DD15101300	Ceramic 100pF ±5%
C122	1	1	1	1	DF15152300	Film 0.0015pF ±5%
C123	1	1	1	1	DF15392300	Film 0.0039μF ±5%
C124	1	1	1	1	DF55681090	Film 680pF ±5%
C125	1	1	1	1	EA33405030	Elect 0.33μF 50V
C126	1	1	1	1	EA10602530	Elect 10μF 25V
C127	1	1	1	1	EA10405030	Elect 0.1μF 50V
C128	1	1	1	1	EA33405030	Elect 0.33μF 50V
C129	1	1	1	1	DF15473300	Film 0.047μF ±5%
C130	1	1	1	1	DF15473300	Film 0.047μF ±5%
C131	1	1	1	1	EA10602530	Elect 10μF 25V
C132	1	1	1	1	DF15273300	Film 0.027μF ±5%
C133	1	1	1	1	DF15562300	Film 0.0056μF ±5%
C134	1	1	1	1	EA10602530	Elect 10μF 25V
C135	1	1	1	1	EA10701030	Elect 100μF 10V
⚠C136	1	1	1	1	EA10702530	Elect 100μF 25V
C137	1	1	1	1	EA10602530	Elect 10μF 25V
C138	1	1	1	1	EA22505030	Elect 2.2μF 50V
C139	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C140	1	1	1	1	EA22505030	Elect 2.2μF 50V
C141	1	1	1	1	EA47405030	Elect 0.47μF 50V
C142	1	1	1	1	DD15471370	Ceramic 470pF ±5%
C143	1	1	1	1	EA10702530	Elect 100μF 25V
C144	1	1	1	1	EA33602530	Elect 33μF 25V
C146	1	1	1	1	EA47505030	Elect 4.7μF 50V
C147	1	1	1	1	EE22405040	Elect 0.22μF 50V
C148	1	1	1	1	EA47505030	Elect 4.7μF 50V
C149	1	1	1	1	EA47505030	Elect 4.7μF 50V
C150	1	1	1	1	DF15152300	Film 0.0015μF ±5%
C151	1	1	1	1	DF55101090	Film 100pF ±5%
C152	1	1	1	1	DF15153300	Film 0.015μF ±5%
C153	1	1	1	1	DF15393300	Film 0.039μF ±5%
C154	1	1	1	1	DF15103300	Film 0.01μF ±5%
C155	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C156	1	1	1	1	DF15822300	Film 0.0082μF ±5%

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
C157	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C158	1	1	1	1	DF15393300	Film 0.039μF ±5%
C159	1	1	1	1	DF15683300	Film 0.068μF ±5%
C160	1	1	1	1	DF15223300	Film 0.022μF ±5%
C161	1	1	1	1	DF15153300	Film 0.015μF ±5%
C162	1	1	1	1	DF15183300	Film 0.018μF ±5%
C163	1	1	1	1	DF15123300	Film 0.012μF ±5%
C164	1	1	1	1	DF15103300	Film 0.01μF ±5%
C165	1	1	1	1	DF15103300	Film 0.01μF ±5%
C166	1	1	1	1	DF15153300	Film 0.015μF ±5%
C167	1	1	1	1	DF17222300	Film 0.0022μF ±20%
C168	1	1	1	1	DF17222300	Film 0.0022μF ±20%
C169	1	1	1	1	EA10505030	Elect 1μF 50V
C170	1	1	1	1	EA47601630	Elect 47μF 16V
C171	1	1	1	1	EA47405030	Elect 0.47μF 50V
C172	1	1	1	1	DF55242090	Film 2400pF ±5%
C173	1	1	1	1	EA10602530	Elect 10μF 25V
C174	1	1	1	1	EA10602530	Elect 10μF 25V
C201	1	1	1	1	DF55271090	Film 270pF ±5%
C202	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C203	1	1	1	1	EE10601640	Elect 10μF 16V
C204	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C205	1	1	1	1	EA47601030	Elect 47μF 10V
C206	1	1	1	1	DF15153300	Film 0.015μF ±5%
C207	1	1	1	1	EA22602530	Elect 22μF 25V
C208	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C209	1	1	1	1	EA10602530	Elect 10μF 25V
C210	1	1	1	1	EA22505030	Elect 2.2μF 50V
C211	1	1	1	1	DF15123300	Film 0.012μF ±5%
C212	1	1	1	1	DF15102300	Film 0.001μF ±5%
C213	1	1	1	1	EA33405030	Elect 0.33μF 50V
C214	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C215	1	1	1	1	EA33405030	Elect 0.33μF 50V
C216	1	1	1	1	EA10702530	Elect 100μF 25V
C217	1	1	1	1	EA10505030	Elect 1μF 50V
C218	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C219	1	1	1	1	EE10505040	Elect 1μF 50V
⚠C220	1	1	1	1	EA10702530	Elect 100μF 25V
C221	1	1	1	1	DD15101300	Ceramic 100pF ±5%
C222	1	1	1	1	DF15152300	Film 0.0015pF ±5%
C223	1	1	1	1	DF15392300	Film 0.0039μF ±5%
C224	1	1	1	1	DF55681090	Film 680pF ±5%
C225	1	1	1	1	EA33405030	Elect 0.33μF 50V
C226	1	1	1	1	EA10602530	Elect 10μF 25V
C227	1	1	1	1	EA10405030	Elect 0.1μF 50V
C228	1	1	1	1	EA33405030	Elect 0.33μF 50V
C229	1	1	1	1	DF15473300	Film 0.047μF ±5%
C230	1	1	1	1	DF15472300	Film 0.0047μF ±5%
C231	1	1	1	1	EA10602530	Elect 10μF 25V
C232	1	1	1	1	DF15273300	Film 0.027μF ±5%
C233	1	1	1	1	DF15562300	Film 0.0056μF ±5%
C234	1	1	1	1	EA10602530	Elect 10μF 25V
C235	1	1	1	1	EA10701030	Elect 100μF 10V
⚠C236	1	1	1	1	EA10702530	Elect 100μF 25V
C237	1	1	1	1	EA10602530	Elect 10μF 25V
C238	1	1	1	1	EA22505030	Elect 2.2μF 50V
C239	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C240	1	1	1	1	EA22505030	Elect 2.2μF 50V
C241	1	1	1	1	EA47405030	Elect 0.47μF 50V
C242	1	1	1	1	DD15471370	Ceramic 470pF ±5%
C243	1	1	1	1	EA10702530	Elect 100μF 25V
C244	1	1	1	1	EA33602530	Elect 33μF 25V
C246	1	1	1	1	EA47505030	Elect 4.7μF 50V
C247	1	1	1	1	EE22405040	Elect 0.22μF 50V
C248	1	1	1	1	EA47505030	Elect 4.7μF 50V

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
C249	1	1	1	1	EA47505030	Elect 4.7μF 50V
C250	1	1	1	1	DF15152300	Film 0.0015μF ±5%
C251	1	1	1	1	DF55101090	Film 100pF ±5%
C252	1	1	1	1	DF15153300	Film 0.015μF ±5%
C253	1	1	1	1	DF15393300	Film 0.039μF ±5%
C254	1	1	1	1	DF15103300	Film 0.01μF ±5%
C255	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C256	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C257	1	1	1	1	DF15822300	Film 0.0082μF ±5%
C258	1	1	1	1	DF15393300	Film 0.039μF ±5%
C259	1	1	1	1	DF15683300	Film 0.068μF ±5%
C260	1	1	1	1	DF15223300	Film 0.022μF ±5%
C261	1	1	1	1	DF15153300	Film 0.015μF ±5%
C262	1	1	1	1	DF15183300	Film 0.018μF ±5%
C263	1	1	1	1	DF15123300	Film 0.012μF ±5%
C264	1	1	1	1	DF15103300	Film 0.01μF ±5%
C265	1	1	1	1	DF15103300	Film 0.01μF ±5%
C266	1	1	1	1	DF15153300	Film 0.015μF ±5%
C267	1	1	1	1	DF17222300	Film 0.0022μF ±20%
C268	1	1	1	1	DF17222300	Film 0.0022μF ±20%
C269	1	1	1	1	EA10505030	Elect 1μF 50V
C270	1	1	1	1	EA47601630	Elect 47μF 16V
C271	1	1	1	1	EA47405030	Elect 0.47μF 50V
C272	1	1	1	1	DF55242090	Film 2400pF ±5%
C273	1	1	1	1	EA10602530	Elect 10μF 25V
C274	1	1	1	1	EA10602530	Elect 10μF 25V
C276	1	1	1	1	DK18104010	Ceramic 0.1μF
C277	1	1	1	1	DK18104010	Ceramic 0.1μF
C301	1	1	1	1	EA22702530	Elect 220μF 25V
C302	1	1	1	1	EA10701030	Elect 100μF 10V
						PK11-RESISTORS **(All Resistors are ±5% & ¼W)**
R101	1	1	1	1	GD05100140	10Ω
R102	1	1	1	1	GD05103140	10KΩ
R103	1	1	1	1	GD05104140	100KΩ
R104	1	1	1	1	GD05221140	220Ω
R105	1	1	1	1	GD05561140	560Ω
R106	1	1	1	1	GD05271140	270Ω
R107	1	1	1	1	RN05184140	180KΩ
R108	1	1	1	1	GD05333140	33KΩ
R109	1	1	1	1	GD05103140	10KΩ
R110	1	1	1	1	GD05223140	22KΩ
R111	1	1	1	1	GD05394140	390KΩ
R113	1	1	1	1	RA05020160	5KΩTrimming, P.B. EQ
R114	1	1	1	1	GD05562140	5.6KΩ
R115	1	1	1	1	GD05822140	8.2KΩ
R116	1	1	1	1	RN05222140	2.2KΩ
R117	1	1	1	1	GD05822140	8.2KΩ
R118	1	1	1	1	GD05682140	6.8KΩ
R119	1	1	1	1	GD05561140	560Ω
R120	1	1	1	1	RA05030090	50KΩTrim., Play Level
R121	1	1	1	1	7506100190	Jumper
R122	1	1	1	1	RN05272140	2.7KΩ
R123	1	1	1	1	RN05105140	1MΩ
R124	1	1	1	1	RN05392140	3.9KΩ
R125	1	1	1	1	GD05102140	1KΩ
R126	1	1	1	1	GD05473140	47KΩ
R127	1	1	1	1	GD05154140	150KΩ
R128	1	1	1	1	GD05274140	270KΩ
R129	1	1	1	1	GD05822140	8.2KΩ
R130	1	1	1	1	GD05823140	82KΩ
R131	1	1	1	1	GD05473140	47KΩ
R132	1	1	1	1	GD05332140	3.3KΩ
R133	1	1	1	1	GD05181140	180Ω
R134	1	1	1	1	GD05104140	100KΩ
⚠R135	1	1	1	1	GA05561010	560Ω 1W

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
⚠R136	1	1	1	1	GG05101140	100Ω
R137	1	1	1	1	RN05105140	1MΩ
R138	1	1	1	1	GD05182140	1.8KΩ
R139	1	1	1	1	GD05102140	1KΩ
R140	1	1	1	1	GD05102140	1KΩ
R141	1	1	1	1	GD05102140	1KΩ
R142	1	1	1	1	GD05333140	33KΩ
R143	1	1	1	1	GD05561140	560Ω
R144	1	1	1	1	GA05681010	680Ω 1W
R145	1	1	1	1	GD05104140	100KΩ
R146	1	1	1	1	GD05151140	150Ω
R147	1	1	1	1	GD05102140	1KΩ
R148	1	1	1	1	RA02030060	20KΩTrimming, Rec Level
R149	1	1	1	1	RA02030060	20KΩTrimming, Rec Level
R152	1	1	1	1	GD05682140	6.8KΩ
R153	1	1	1	1	GD05153140	15KΩ
R154	1	1	1	1	GD05682140	6.8KΩ
R155	1	1	1	1	GD05472140	4.7KΩ
R156	1	1	1	1	GD05103140	10KΩ
R157	1	1	1	1	GD05561140	560Ω
R158	1	1	1	1	GD05153140	15KΩ
R159	1	1	1	1	GD05564140	560KΩ
R160	1	1	1	1	GD05473140	47KΩ
R161	1	1	1	1	GD05102140	1KΩ
R162	1	1	1	1	GD05153140	15KΩ
R163	1	1	1	1	GD05103140	10KΩ
R164	1	1	1	1	GD05272140	2.7KΩ
R165	1	1	1	1	GD05122140	1.2KΩ
R166	1	1	1	1	GD05222140	2.2KΩ
R167	1	1	1	1	GD05561140	560Ω
R168	1	1	1	1	GD05121140	120Ω
R169	1	1	1	1	GD05101140	100Ω
R170	1	1	1	1	GD05100140	10Ω
R171	1	1	1	1	GD05101140	100Ω
R172	1	1	1	1	GD05680140	68Ω
R173	1	1	1	1	GD05121140	120Ω
R174	1	1	1	1	GD05121140	120Ω
R175	1	1	1	1	GD05560140	56Ω
R176	1	1	1	1	GD05822140	8.2KΩ
R177	1	1	1	1	GD05822140	8.2KΩ
R178	1	1	1	1	GD05822140	8.2KΩ
R179	1	1	1	1	GD05822140	8.2KΩ
R180	1	1	1	1	GD05333140	33KΩ
R181	1	1	1	1	GD05244140	240KΩ
R182	1	1	1	1	GD05332140	3.3KΩ
R183	1	1	1	1	RA01030240	10KΩTrimming
R184	1	1	1	1	GD05824140	820KΩ
R185	1	1	1	1	GD05102140	1KΩ
R186	1	1	1	1	GD05332140	3.3KΩ
R187	1	1	1	1	RN05105140	1MΩ
R191	1	1	1	1	GD05272140	2.7KΩ
R192	1	1	1	1	GD05151140	150Ω
R193	1	1	1	1	GD05101140	100Ω
R194	1	1	1	1	GD05472140	4.7KΩ
R201	1	1	1	1	GD05100140	10Ω
R202	1	1	1	1	GD05103140	10KΩ
R203	1	1	1	1	GD05104140	100KΩ
R204	1	1	1	1	GD05221140	220Ω
R205	1	1	1	1	GD05561140	560Ω
R206	1	1	1	1	GD05271140	270Ω
R207	1	1	1	1	RN05184140	180KΩ
R208	1	1	1	1	GD05333140	33KΩ

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
R209	1	1	1	1	GD05103140	10KΩ
R210	1	1	1	1	GD05223140	22KΩ
R211	1	1	1	1	GD05394140	390KΩ
R213	1	1	1	1	RA05020160	5KΩTrimming, P.B. EQ
R214	1	1	1	1	GD05562140	5.6KΩ
R215	1	1	1	1	GD05822140	8.2KΩ
R216	1	1	1	1	RN05222140	2.2KΩ
R217	1	1	1	1	GD05822140	8.2KΩ
R218	1	1	1	1	GD05682140	6.8KΩ
R219	1	1	1	1	GD05561140	560Ω
R220	1	1	1	1	RA05030090	50KΩTrimming, Play Level
R221	1	1	1	1	7506100190	Jumper
R222	1	1	1	1	RN05272140	2.7KΩ
R223	1	1	1	1	RN05105140	1MΩ
R224	1	1	1	1	RN05392140	3.9KΩ
R225	1	1	1	1	GD05102140	1KΩ
R226	1	1	1	1	GD05473140	47KΩ
R227	1	1	1	1	GD05154140	150KΩ
R228	1	1	1	1	GD05274140	270KΩ
R229	1	1	1	1	GD05822140	8.2KΩ
R230	1	1	1	1	GA05123140	12KΩ
R231	1	1	1	1	GD05473140	47KΩ
R232	1	1	1	1	GD05332140	3.3KΩ
R233	1	1	1	1	GD05181140	180Ω
R234	1	1	1	1	GD05104140	100KΩ
⚠ R235	1	1	1	1	GA05561010	560Ω 1W
⚠ R236	1	1	1	1	GG05101140	100Ω
R237	1	1	1	1	RN05105140	1MΩ
R238	1	1	1	1	GD05182140	1.8KΩ
R239	1	1	1	1	GD05102140	1KΩ
R240	1	1	1	1	GD05102140	1KΩ
R241	1	1	1	1	GD05102140	1KΩ
R242	1	1	1	1	GD05333140	33KΩ
R243	1	1	1	1	GD05561140	560Ω
R244	1	1	1	1	GA05681010	680Ω 1W
R245	1	1	1	1	GD05104140	100KΩ
R246	1	1	1	1	GD05151140	150Ω
R247	1	1	1	1	GD05102140	1KΩ
R248	1	1	1	1	RA02030060	20KΩTrimming, Rec Level
R249	1	1	1	1	RA02030060	20KΩTrimming, Rec Level
R251	1	1	1	1	GD05562140	5.6KΩ
R252	1	1	1	1	GD05682140	6.8KΩ
R253	1	1	1	1	GD05153140	15KΩ
R254	1	1	1	1	GD05682140	6.8KΩ
R255	1	1	1	1	GD05472140	4.7KΩ
R256	1	1	1	1	GD05103140	10KΩ
R257	1	1	1	1	GD05561140	560Ω
R258	1	1	1	1	GD05153140	15KΩ
R259	1	1	1	1	GD05564140	560KΩ
R260	1	1	1	1	GD05473140	47KΩ
R261	1	1	1	1	GD05102140	1KΩ
R262	1	1	1	1	GD05153140	15KΩ
R263	1	1	1	1	GD05103140	10KΩ
R264	1	1	1	1	GD05272140	2.7KΩ
R265	1	1	1	1	GD05122140	1.2KΩ
R266	1	1	1	1	GD05222140	2.2KΩ
R267	1	1	1	1	GD05561140	560Ω
R268	1	1	1	1	GD05121140	120Ω
R269	1	1	1	1	GD05101140	100Ω

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
R270	1	1	1	1	GD05100140	10Ω
R271	1	1	1	1	GD05101140	100Ω
R272	1	1	1	1	GD05680140	68Ω
R273	1	1	1	1	GD05121140	120Ω
R274	1	1	1	1	GD05121140	120Ω
R275	1	1	1	1	GD05560140	56Ω
R276	1	1	1	1	GD05822140	8.2KΩ
R277	1	1	1	1	GD05822140	8.2KΩ
R278	1	1	1	1	GD05822140	8.2KΩ
R279	1	1	1	1	GD05822140	8.2KΩ
R280	1	1	1	1	GD05333140	33KΩ
R281	1	1	1	1	GD05244140	240KΩ
R282	1	1	1	1	GD05332140	3.3KΩ
R283	1	1	1	1	RA01030240	10KΩTrimming
R284	1	1	1	1	GD05824140	820KΩ
R285	1	1	1	1	GD05102140	1KΩ
R286	1	1	1	1	GD05332140	3.3KΩ
R287	1	1	1	1	RN05105140	1MΩ
R291	1	1	1	1	GD05272140	2.7KΩ
R292	1	1	1	1	GD05151140	150Ω
R293	1	1	1	1	GD05101140	100Ω
R294	1	1	1	1	GD05472140	4.7KΩ
R301	1	1	1	1	GA05102010	1KΩ 1W
R302	1	1	1	1	GD05154140	150KΩ
R303	1	1	1	1	GD05101140	100Ω
R305	1	1	1	1	GD05151010	150Ω 1W
R306	1	1	1	1	GD05122140	1.2KΩ
R307	1	1	1	1	RN05392140	3.9Ω
R308	1	1	1	1	GD05332140	3.3KΩ
R309	1	1	1	1	GD05183140	18KΩ
R310	1	1	1	1	RK02020070	2KΩVariable, Bias Fine
R311	1	1	1	1	GD05562140	5.6KΩ
R312	1	1	1	1	RN05222140	2.2KΩ
R313	1	1	1	1	GD05393140	39KΩ
R314	1	1	1	1	RA03020030	3KΩTrimming, Bias Adj.
R315	1	1	1	1	RA02030060	20KΩTrimming, Bias Adj.
R316	1	1	1	1	RA02030060	20KΩTrimming, Bias Adj.
R317	1	1	1	1	GD05562140	5.6KΩ
R318	1	1	1	1	GD05562140	5.6KΩ
R319	1	1	1	1	GD05332140	3.3KΩ
R350	1	1	1	1	GD05331140	330Ω
R351	1	1	1	1	GD05122140	1.2KΩ
R352	1	1	1	1	RA01020110	1KΩTrimming, Hi-Speed
R371			1	1	GD05102140	1.2KΩ
R372			1	1	GD05102140	1.2KΩ
R373			1	1	GD05562140	5.6KΩ
R374			1	1	GD05562140	5.6KΩ
						PK11-SEMICONDUCTORS
Q101	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q102	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q103	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q104	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q105	1	1	1	1	HT314001E0	Transistor 2SC1400
Q106	1	1	1	1	HC10001360	IC LM1011AN
Q107	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q108	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q109	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q110	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q111	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q112	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q113	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q114	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q115	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q116	1	1	1	1	HT326341S0	Transistor 2SC2634(S)

- (U): for U.S.A.
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REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
Q117	1	1	1	1	HF200301C0	F.E.T. 2SK30A(Y)
Q118	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q201	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q202	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q203	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q204	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q205	1	1	1	1	HT314001E0	Transistor 2SC1400
Q206	1	1	1	1	HC10001360	IC LM1011AN
Q207	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q208	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q209	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q210	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q211	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q212	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q213	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q214	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q215	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q216	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q217	1	1	1	1	HF200301C0	F.E.T. 2SK30A(Y)
Q218	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q301	1	1	1	1	HT309451P0	Transistor 2SC945(P)
Q302	1	1	1	1	HT309451P0	Transistor 2SC945(P)
Q303	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q304	1	1	1	1	HD20011050	Diode 1S1555
Q305	1	1	1	1	HD30033090	Zener WZ052
Q306	1	1	1	1	HD20011050	Diode 1S1555
Q307	1	1	1	1	HD20011050	Diode 1S1555
Q308	1	1	1	1	HD20011050	Diode 1S1555
Q309	1	1	1	1	HD20011050	Diode 1S1555
Q310	1	1	1	1	HD30002060	Zener RD-3.9
Q311	1	1	1	1	HD30002060	Zener RD-3.9
⚠ Q312	1	1	1	1	HD30030090	Zener WZ177
⚠ Q313	1	1	1	1	HD30030090	Zener WZ177
⚠ Q320	1	1	1	1	HT403131E0	Transistor 2SD313(E)
						PK11-MISCELLANEOUS
L101	1	1	1	1	LC22260050	Choke Coil 22mH, Bias Trap
L102	1	1	1	1	LS70305010	M.P.X. Coil 22mH, 19KHz
L103	1	1	1	1	LC22260060	Choke Coil 22mH, Bias Trap
L104	1	1	1	1	LC24750030	Choke Coil 4.7mH, Rec
L105	1	1	1	1	LC24750030	Choke Coil 4.7mH, Rec
L201	1	1	1	1	LC22260050	Choke Coil 22mH, Bias Trap
L202	1	1	1	1	LS70305010	M.P.X. Coil 22mH, 19KHz
L203	1	1	1	1	LC22260060	Choke Coil 22mH, Bias Trap
L204	1	1	1	1	LC24750030	Choke Coil 4.7mH, Rec
L205	1	1	1	1	LC24750030	Choke Coil 4.7mH, Rec
S101	1	1	1	1	SS09020120	Slide Switch, Rec/Play
S102	1	1	1	1	SS09020120	Slide Switch, Rec/Play
S103	1	1	1	1	SR12020020	Rotary Switch, Speed Select
S104	1	1	1	1	SP10040030	Push Switch, Normal
S105	1	1	1	1	SP10040030	Push Switch, CrO_2
S106	1	1	1	1	SP10040030	Push Switch, FeCr
S107	1	1	1	1	SP10040030	Push Switch, Metal
S108	1	1	1	1	SS04030130	Slide Switch, MPX/Dolby
S109	1	1	1	1	SB11910010	Switch Band, Flx
S110	1	1	1	1	SC00030030	Switch, 3 Position
P205	1	1	1	1	YJ06001430	Jack, (9P)
P206	1	1	1	1	YP06001040	Plug, (3P)
J351	1	1			YT02040260	Terminal, (4P) RCA
J351			1	1	YT02050020	Terminal, (4P) RCA/Din
						PK12-MIC LINE VOLUME CIRCUIT BOARD
PK12	1	1	1	1	YK42791320	P.W. Board, Mic Line Vol.
	1	1	1	1	ZZ42791320	P.W. Board Assembly

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						PK12-RESISTORS
R391	1	1	1	1	RD05030110	50KΩ(A) Variable, Mic Vol.
R392	1	1	1	1	RD05030110	50KΩ(A) Variable, Mic Vol.
R393	1	1	1	1	RD01040100	100KΩ(A) Variable, Line Vol.
R394	1	1	1	1	RD01040100	100KΩ(A) Variable, Line Vol.
R395	1	1	1	1	GD05223140	22KΩ ±5% ¼W
R396	1	1	1	1	GD05223140	22KΩ ±5% ¼W
						PK13-OUTPUT VOLUME CIRCUIT BOARD
PK13	1	1	1	1	YK42791330	P.W. Board, Output Volume
	1	1	1	1	ZZ42791330	P.W. Board Assembly
						PK13-RESISTORS
R381	1	1	1	1	RM05030830	50KΩ(A) Variable, Output
R382	1	1	1	1	RM05030830	50KΩ(A) Variable, Output
						PK21-COMPUTER CIRCUIT BOARD
PK21	1	1	1	1	YK42792710	P.W. Board, Computer
	1	1	1	1	ZZ42792710	P.W. Board Assembly
						PK21-CAPACITORS
C501	1	1	1	1	DF15152300	Film 0.0015μF ±5%
C502	1	1	1	1	EA33505030	Elect 3.3μF 50V
C503	1	1	1	1	EA22601630	Elect 22μF 16V
C504	1	1	1	1	DF15103300	Film 0.01μF ±5%
C505	1	1	1	1	EA47505030	Elect 4.7μF 50V
C506	1	1	1	1	EA10505030	Elect 1μF 50V
C507	1	1	1	1	DF15562300	Film 0.0056μF ±5%
C508	1	1	1	1	EA47505030	Elect 4.7μF 50V
C509	1	1	1	1	DF15102300	Film 0.001μF ±5%
C510	1	1	1	1	EA10505030	Elect 1μF 50V
C511	1	1	1	1	EA47505030	Elect 4.7μF 50V
C512	1	1	1	1	EA10405030	Elect 0.1μF 50V
C513	1	1	1	1	EA47502530	Elect 4.7μF 25V
C514	1	1	1	1	EA22602530	Elect 22μF 25V
C515	1	1	1	1	EA22602530	Elect 22μF 25V
C516	1	1	1	1	EA22601630	Elect 22μF 16V
C517	1	1	1	1	EA10602530	Elect 10μF 25V
C518	1	1	1	1	DF15472300	Film 0.0047μF ±5%
C519	1	1	1	1	DD15330370	Ceramic 33pF ±5%
⚠ C520	1	1	1	1	EA22702530	Elect 220μF 25V
C531	1	1	1	1	EA22601630	Elect 22μF 16V
C521	1	1	1	1	EA22505030	Elect 2.2μF 50V
C522	1	1	1	1	EA22505030	Elect 2.2μF 50V
C523	1	1	1	1	EA33602530	Elect 33μF 25V
C524	1	1	1	1	EA10602530	Elect 10μF 25V
C525	1	1	1	1	EA10701630	Elect 100μF 16V
C526	1	1	1	1	DK18103320	Ceramic 0.01μF
C527	1	1	1	1	DD15330370	Ceramic 33pF ±5%
C528	1	1	1	1	DK18103320	Ceramic 0.01μF
C529	1	1	1	1	EA47405030	Elect 0.47μF 50V
C530	1	1	1	1	EA22702530	Elect 220μF 25V
C531	1	1	1	1	EA22601630	Elect 22μF 16V
C532	1	1	1	1	DK16103300	Ceramic 0.01μF
C534	1	1	1	1	DK18104010	Ceramic 0.1μF
C533	1	1	1	1	DK18104010	Ceramic 0.1μF
C601	1	1	1	1	EA22505030	Elect 2.2μF 50V
C602	1	1	1	1	EA10602530	Elect 10μF 25V
C603	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C604	1	1	1	1	EA10505030	Elect 1μF 50V
C605	1	1	1	1	EA10505030	Elect 1μF 50V
C606	1	1	1	1	DF15103300	Film 0.01μF ±5%
C607	1	1	1	1	DF15103300	Film 0.01μF ±5%
C608	1	1	1	1	DF15333300	Film 0.03μF ±5%
C609	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C610	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C611	1	1	1	1	DD15561370	Ceramic 560pF ±5%

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
C612	1	1	1	1	DF15682300	Film 0.0068μF ±5%
C621	1	1	1	1	EA22505030	Elect 2.2μF 50V
C622	1	1	1	1	EA10602530	Elect 10μF 25V
C623	1	1	1	1	DD15470370	Ceramic 47pF ±5%
C624	1	1	1	1	EA10505030	Elect 1μF 50V
C625	1	1	1	1	EA10505030	Elect 1μF 50V
C626	1	1	1	1	DF15103300	Elect 0.01μF ±5%
C627	1	1	1	1	DF15103300	Film 0.01μF ±5%
C628	1	1	1	1	DF15103300	Film 0.01μF ±5%
C629	1	1	1	1	DF15332300	Film 0.0032μF ±5%
C641	1	1	1	1	EA33602530	Elect 33μF 25V
						PK21-RESISTORS **(All Resistors are ±5% & ¼W)**
R501	1	1	1	1	GD05104140	100KΩ
R502	1	1	1	1	GD05102140	1KΩ
R503	1	1	1	1	GD05333140	33KΩ
R504	1	1	1	1	GD05823140	82KΩ
R506	1	1	1	1	GD05102140	1KΩ
R507	1	1	1	1	GD05184140	180KΩ
R508	1	1	1	1	GD05103140	10KΩ
R509	1	1	1	1	GD05562140	5.6KΩ
R510	1	1	1	1	GD05221140	220Ω
R511	1	1	1	1	GD05184140	180KΩ
R512	1	1	1	1	GD05103140	10KΩ
R513	1	1	1	1	GD05562140	5.6KΩ
R514	1	1	1	1	GD05221140	220Ω
R515	1	1	1	1	GD05104140	100KΩ
R516	1	1	1	1	GD05103140	10KΩ
R517	1	1	1	1	GD05152140	1.5KΩ
R518	1	1	1	1	GD05201140	200Ω
R519	1	1	1	1	RA01030260	10KΩ Trimming, Gain Cont.
R520	1	1	1	1	GD05333140	33KΩ
R521	1	1	1	1	GD05222140	2.2KΩ
R522	1	1	1	1	GD05122140	1.2KΩ
R523	1	1	1	1	GD05102140	1KΩ
R524	1	1	1	1	GD05562140	5.6KΩ
R525	1	1	1	1	GD05822140	8.2KΩ
R526	1	1	1	1	GD05473140	47KΩ
R527	1	1	1	1	GD05100140	10Ω
R528	1	1	1	1	GD05222140	2.2KΩ
R529	1	1	1	1	GD05472140	4.7KΩ
R530	1	1	1	1	GD05272140	2.7KΩ
R531	1	1	1	1	GD05103140	10KΩ
R532	1	1	1	1	GD05103140	10KΩ
R533	1	1	1	1	GD05472140	4.7KΩ
R534	1	1	1	1	GD05472140	4.7KΩ
R535	1	1	1	1	GD05330140	33Ω
R536	1	1	1	1	GD05103140	10KΩ
R537	1	1	1	1	GD05103140	10KΩ
R538	1	1	1	1	GD05104140	100KΩ
R539	1	1	1	1	GD05104140	100KΩ
R540	1	1	1	1	GD05272140	2.7KΩ
R541	1	1	1	1	GD05682140	6.8KΩ
R542	1	1	1	1	GD05682140	6.8KΩ
R543	1	1	1	1	GD05103140	10KΩ
R544	1	1	1	1	GD05821140	820Ω
R545	1	1	1	1	GD05681140	680Ω
R546	1	1	1	1	GD05821140	820Ω
R547	1	1	1	1	GD05103140	10KΩ
R548	1	1	1	1	GD05103140	10KΩ
R549	1	1	1	1	GD05123140	12KΩ
R550	1	1	1	1	GD05472140	4.7KΩ
R551	1	1	1	1	GD05101140	100Ω
R552	1	1	1	1	GD05822140	8.2KΩ

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
R553	1	1	1	1	GD05272140	2.7KΩ
R554	1	1	1	1	GD05103140	10KΩ
R555	1	1	1	1	GD05472140	4.7KΩ
R556	1	1	1	1	GD05472140	4.7KΩ
R557	1	1	1	1	GD05330140	33Ω
R558	1	1	1	1	GD05103140	10KΩ
R559	1	1	1	1	GD05682140	6.8KΩ
R560	1	1	1	1	GD05103140	10KΩ
R561	1	1	1	1	GD05103140	10KΩ
R562	1	1	1	1	GD05102140	1KΩ
R563	1	1	1	1	GD05103140	10KΩ
R564	1	1	1	1	GD05821140	820Ω
R565	1	1	1	1	GD05103140	10KΩ
R566	1	1	1	1	GD05103140	10KΩ
R567	1	1	1	1	GD05102140	1KΩ
R568	1	1	1	1	GD05331140	330Ω
R569	1	1	1	1	GD05272140	2.7KΩ
R570	1	1	1	1	GD05272140	2.7KΩ
R571	1	1	1	1	GD05820140	82Ω
R572	1	1	1	1	GD05121140	120Ω
R573	1	1	1	1	GD05121140	120Ω
R574	1	1	1	1	GD05121140	120Ω
R575	1	1	1	1	GD05121140	120Ω
R576	1	1	1	1	GD05121140	120Ω
R577	1	1	1	1	GD05121140	120Ω
R578	1	1	1	1	GD05121140	120Ω
R579	1	1	1	1	GD05103140	10KΩ
R580	1	1	1	1	GD05681140	680Ω
R581	1	1	1	1	GD05152140	1.5KΩ
R582	1	1	1	1	GD05152140	1.5KΩ
R583	1	1	1	1	GD05152140	1.5KΩ
R584	1	1	1	1	GD05152140	1.5KΩ
R585	1	1	1	1	GD05152140	1.5KΩ
R586	1	1	1	1	GD05152140	1.5KΩ
R587	1	1	1	1	GD05332140	3.3KΩ
R588	1	1	1	1	GD05332140	3.3KΩ
R589	1	1	1	1	GD05103140	10KΩ
R590	1	1	1	1	GD05103140	10KΩ
R591	1	1	1	1	GD05103140	10KΩ
R592	1	1	1	1	GD05103140	10KΩ
R593	1	1	1	1	GD05103140	10KΩ
R594	1	1	1	1	GD05103140	10KΩ
R595	1	1	1	1	GD05103140	10KΩ
R596	1	1	1	1	GD05562140	5.6KΩ
R597	1	1	1	1	GD05182140	1.8KΩ
R598	1	1	1	1	GD05104140	100KΩ
R599	1	1	1	1	GD05152140	1.5KΩ
R601	1	1	1	1	GD05103140	10KΩ
R602	1	1	1	1	RA03020030	3KΩ Trimming
R603	1	1	1	1	GD05392140	3.9KΩ
R604	1	1	1	1	GD05123140	12KΩ
R605	1	1	1	1	GA05681010	680Ω 1W
R606	1	1	1	1	GD05104140	100KΩ
R607	1	1	1	1	GD05102140	1KΩ
R608	1	1	1	1	GD05562140	5.6KΩ
R609	1	1	1	1	GD05105140	1MΩ
R610	1	1	1	1	RA05030090	50KΩ Trimming
R611	1	1	1	1	GD05224140	220KΩ
R612	1	1	1	1	GD05473140	47KΩ
R613	1	1	1	1	GD05272140	2.7KΩ
R614	1	1	1	1	GD05122140	1.2KΩ
R615	1	1	1	1	RA05030090	50KΩ Trimming
R616	1	1	1	1	GD05273140	27KΩ
R617	1	1	1	1	GD05151140	150Ω
R618	1	1	1	1	GD05124140	120KΩ

- (U): for U.S.A.
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REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION
R619	1	1	1	1	GD05472140	4.7KΩ
R620	1	1	1	1	GD05561140	560Ω
R621	1	1	1	1	GD05103140	10KΩ
R622	1	1	1	1	RA03020030	3KΩ Trimming
R623	1	1	1	1	GD05392140	3.9KΩ
R624	1	1	1	1	GD05123140	12KΩ
R625	1	1	1	1	GA05681010	680Ω 1W
R626	1	1	1	1	GD05104140	100KΩ
R627	1	1	1	1	GD05102140	1KΩ
R628	1	1	1	1	GD05562140	5.6KΩ
R629	1	1	1	1	GD05105140	1MΩ
R630	1	1	1	1	RA05030090	50KΩ Trimming
R631	1	1	1	1	GD05224140	220KΩ
R632	1	1	1	1	GD05473140	47KΩ
R633	1	1	1	1	GD05272140	2.7KΩ
R634	1	1	1	1	GD05122140	1.2KΩ
R642	1	1	1	1	GG05821140	820Ω
R643	1	1	1	1	GD05562140	5.6KΩ
⚠ R644	1	1	1	1	GA05181010	180Ω 1W
R645	1	1	1	1	GD05473140	47KΩ
R646	1	1	1	1	GD05123140	12KΩ
R647	1	1	1	1	GD05123140	12KΩ
R648	1	1	1	1	GD05822140	8.2KΩ
R649	1	1	1	1	GD05822140	8.2KΩ
R691	1	1	1	1	GD05562140	5.6KΩ
R692	1	1	1	1	GD05472140	4.7KΩ
R693	1	1	1	1	GD05472140	4.7KΩ
R694	1	1	1	1	GD05683140	68KΩ
R695	1	1	1	1	GD05123140	12KΩ
R696	1	1	1	1	GD05472140	4.7KΩ
R697	1	1	1	1	GD05562140	5.6KΩ
R701	1	1	1	1	GD05473140	47KΩ
R702	1	1	1	1	GD05473140	47KΩ
R703	1	1	1	1	GD05473140	47KΩ
R704	1	1	1	1	GD05473140	47KΩ
R705	1	1	1	1	GD05473140	47KΩ
R706	1	1	1	1	GD05473140	47KΩ
R707	1	1	1	1	GD05473140	47KΩ
R708	1	1	1	1	GD05473140	47KΩ
R709	1	1	1	1	GD05103140	10KΩ
R710	1	1	1	1	GD05103140	10KΩ
R711	1	1	1	1	GD05103140	10KΩ
R712	1	1	1	1	GD05103140	10KΩ
R713	1	1	1	1	GD05103140	10KΩ
R714	1	1	1	1	GD05103140	10KΩ
R715	1	1	1	1	GD05103140	10KΩ
⚠ R731	1	1	1	1	GG05330140	33Ω
R732	1	1	1	1	GD05101140	100Ω
						PK21-SEMICONDUCTORS
Q501	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q502	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q503	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q504	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q505	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q506	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q507	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q508	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q509	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q510	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q511	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q512	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q513	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q514	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q515	1	1	1	1	HT326341S0	Transistor 2SC2634(S)

REF. DESIG.	Q'TY U	C	N	A	PART NO.	DESCRIPTION
Q516	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q517	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q518	1	1	1	1	HD20011050	Diode 1S1555
Q522	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q523	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q524	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q525	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q526	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q527	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q528	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q529	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q530	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q531	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q532	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q533	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q534	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q535	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q536	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q537	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q538	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q539	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q540	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q541	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q542	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q543	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q544	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q545	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q546	1	1	1	1	HT326341T0	Transistor 2SC2634(T)
Q547	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q548	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q549	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q550	1	1	1	1	HD20011050	Diode 1S1555
Q551	1	1	1	1	HD20011050	Diode 1S1555
Q552	1	1	1	1	HD20011050	Diode 1S1555
Q553	1	1	1	1	HD20011050	Diode 1S1555
Q554	1	1	1	1	HD20011050	Diode 1S1555
Q555	1	1	1	1	HD20011050	Diode 1S1555
Q556	1	1	1	1	HD20011050	Diode 1S1555
Q557	1	1	1	1	HD10001010	Diode 1N34A
Q558	1	1	1	1	HD10001010	Diode 1N34A
Q559	1	1	1	1	HD10001010	Diode 1N34A
Q560	1	1	1	1	HD20011050	Diode 1S1555
Q561	1	1	1	1	HD30013060	Zener RD11EB3
Q562	1	1	1	1	HD30014060	Zener RD24EB2
Q563	1	1	1	1	HD20011050	Diode 1S1555
Q564	1	1	1	1	HD20011050	Diode 1S1555
Q565	1	1	1	1	HD20011050	Diode 1S1555
Q566	1	1	1	1	HD20011050	Diode 1S1555
Q567	1	1	1	1	HD20011050	Diode 1S1555
Q568	1	1	1	1	HD20011050	Diode 1S1555
Q569	1	1	1	1	HD20011050	Diode 1S1555
Q570	1	1	1	1	HD20011050	Diode 1S1555
Q571	1	1	1	1	HD20011050	Diode 1S1555
Q572	1	1	1	1	HD20011050	Diode 1S1555
Q573	1	1	1	1	HD20011050	Diode 1S1555
Q574	1	1	1	1	HD20011050	Diode 1S1555
Q575	1	1	1	1	HD20011050	Diode 1S1555
Q576	1	1	1	1	HD20011050	Diode 1S1555
Q577	1	1	1	1	HD20011050	Diode 1S1555
Q578	1	1	1	1	HD20011050	Diode 1S1555
Q579	1	1	1	1	HD20011050	Diode 1S1555
Q580	1	1	1	1	HD20011050	Diode 1S1555
Q581	1	1	1	1	HD20011050	Diode 1S1555
Q582	1	1	1	1	HD20011050	Diode 1S1555
Q583	1	1	1	1	HD20011050	Diode 1S1555

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
Q584	1	1	1	1	HD20011050	Diode 1S1555
Q586	1	1	1	1	HD20011050	Diode 1S1555
Q587	1	1	1	1	HD20011050	Diode 1S1555
Q588	1	1	1	1	HD20011050	Diode 1S1555
Q589	1	1	1	1	HD20011050	Diode 1S1555
Q590	1	1	1	1	HD20011050	Diode 1S1555
Q594	1	1	1	1	HD20011050	Diode 1S1555
Q595	1	1	1	1	HD20011050	Diode 1S1555
Q596	1	1	1	1	HD20011050	Diode 1S1555
Q597	1	1	1	1	HD20011050	Diode 1S1555
Q598	1	1	1	1	HD20011050	Diode 1S1555
Q599	1	1	1	1	HD20011050	Diode 1S1555
Q601	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q602	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q603	1	1	1	1	HD10001010	Diode 1N34A
Q604	1	1	1	1	HD10001010	Diode 1N34A
Q605	1	1	1	1	HD30031090	Zener WZ081
Q606	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q607	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q608	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q621	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q622	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q623	1	1	1	1	HD10001010	Diode 1N34A
Q624	1	1	1	1	HD10001010	Diode 1N34A
Q625	1	1	1	1	HD30031090	Zener WZ081
Q626	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
⚠ Q642	1	1	1	1	HT403131E0	Transistor 2SD313(E)
Q643	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
⚠ Q644	1	1	1	1	HD30033090	Zener WZ052
Q645	1	1	1	1	HT309451P0	Transistor 2SC945P
Q646	1	1	1	1	HT309451P0	Transistor 2SC945P
Q647	1	1	1	1	HD20011050	Diode 1S1555
Q648	1	1	1	1	HD20011050	Diode 1S1555
Q701	1	1	1	1	HC10027060	IC μPD546C
Q702	1	1	1	1	HC10016060	IC μPA57C
Q703	1	1	1	1	HC10016060	IC μPA57C
						PK21-MISCELLANEOUS
L501	1	1	1	1	LI10015010	I.F.T. Coil
P501	1	1	1	1	YP06001070	Plug, (9P)
P502	1	1	1	1	YP06001060	Plug, (7P)
P503	1	1	1	1	YP06001050	Plug, (5P)
P504	1	1	1	1	YP06001050	Plug, (5P)
P505	1	1	1	1	YP06001070	Plug, (9P)
P506	1	1	1	1	YP06001740	Plug, (8P)
P507	1	1	1	1	YP06001750	Plug, (10P)
P508	1	1	1	1	YP06001750	Plug, (10P)
P509	1	1	1	1	YP06001050	Plug, (5P)
P621	1	1	1	1	YJ06002280	Jack, (12P)
P622	1	1	1	1	YJ06002270	Jack, (8P)
J601	1	1	1	1	YL01070080	Lug, (7P)
						PK22-DIGITAL & METER LED CIRCUIT BOARD
PK22	1	1	1	1	YK42792720	P.W. Board, Digital & Meter LED
	1	1	1	1	ZZ42792720	P.W. Board Assembly
						PK22-RESISTORS (All Resistors are ±5% & ¼W)
R651	1	1	1	1	GD05221140	220Ω
R652	1	1	1	1	GD05221140	220Ω
R653	1	1	1	1	GD05221140	220Ω
R654	1	1	1	1	GD05221140	220Ω
R655	1	1	1	1	GD05221140	220Ω
R656	1	1	1	1	GD05221140	220Ω
R657	1	1	1	1	GD05221140	220Ω
R658	1	1	1	1	GD05221140	220Ω
R659	1	1	1	1	GD05471140	470Ω
R660	1	1	1	1	GD05471140	470Ω
R661	1	1	1	1	GD05471140	470Ω
R662	1	1	1	1	GD05471140	470Ω
R671	1	1	1	1	GD05221140	220Ω
R672	1	1	1	1	GD05221140	220Ω
R673	1	1	1	1	GD05221140	220Ω
R674	1	1	1	1	GD05221140	220Ω
R675	1	1	1	1	GD05221140	220Ω
R676	1	1	1	1	GD05221140	220Ω
R677	1	1	1	1	GD05221140	220Ω
R678	1	1	1	1	GD05221140	220Ω
R679	1	1	1	1	GD05471140	470Ω
R680	1	1	1	1	GD05471140	470Ω
R681	1	1	1	1	GD05471140	470Ω
R682	1	1	1	1	GD05471140	470Ω
						PK22-SEMICONDUCTORS
Q651	1	1	1	1	HC10001320	IC IR2418B
Q652	1	1	1	1	HI11201320	L.E.D. GL112M4
Q671	1	1	1	1	HC10001320	IC IR2418B
Q672	1	1	1	1	HI11201320	L.E.D. GL112M4
Q711	1	1	1	1	HI10011050	L.E.D. TLR226
Q712	1	1	1	1	HI10011050	L.E.D. TLR226
Q713	1	1	1	1	HI10011050	L.E.D. TLR226
Q715	1	1	1	1	HQ10201020	Display Unit LN524RK
Q716	1	1	1	1	HQ10201020	Display Unit LN524RK
						PK23-PROGRAM SELECTOR CIRCUIT BOARD
PK23	1	1	1	1	YK42792730	P.W. Board, Program Selector
	1	1	1	1	ZZ42792730	P.W. Board Assembly
						PK23-SEMICONDUCTORS
Q751	1	1	1	1	HD20011050	Diode 1S1555
Q752	1	1	1	1	HD20011050	Diode 1S1555
Q753	1	1	1	1	HD20011050	Diode 1S1555
Q754	1	1	1	1	HD20011050	Diode 1S1555
Q755	1	1	1	1	HD20011050	Diode 1S1555
Q756	1	1	1	1	HD20011050	Diode 1S1555
Q757	1	1	1	1	HD20011050	Diode 1S1555
Q758	1	1	1	1	HD20011050	Diode 1S1555
Q759	1	1	1	1	HD20011050	Diode 1S1555
Q760	1	1	1	1	HD20011050	Diode 1S1555
Q761	1	1	1	1	HD20011050	Diode 1S1555
						PK23-SWITCHES
S504	1	1	1	1	SR02050140	Rotary Switch, Memory Count
S505	1	1	1	1	SR02050140	Rotary Switch, Selector
S506	1	1	1	1	SR02030070	Rotary Switch, Program
						PK24-TIMER SWITCH CIRCUIT BOARD
PK24	1	1	1	1	YK42792740	P.W. Board, Timer Switch
	1	1	1	1	ZZ42792740	P.W. Board Assembly
						PK24-SEMICONDUCTORS
Q714	1	1	1	1	HI10009300	L.E.D. AR2132D
Q771	1	1	1	1	HD20011050	Diode 1S1555
						PK24-SWITCH
S503	1	1	1	1	SC02030110	Switch, Timer

- (U): for U.S.A.
- (C): for Canada
- (N): for Europe
- (A): for Australia

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						PK25-REC-MUTE SWITCH CIRCUIT BOARD
PK25	1	1	1	1	YK42792750	P.W. Board, Rec-Mute Switch
	1	1	1	1	ZZ42792750	P.W. Board Assembly
S502	1	1	1	1	SP02010430	Push Switch, Rec-Mute
						PK26-REMOTE JACK CIRCUIT BOARD
PK26	1	1	1	1	YK42792760	P.W. Board, Remote Jack
	1	1	1	1	ZZ42792760	P.W. Board Assembly
R771	1	1	1	1	GD05104140	Resistor 100KΩ ±5% ¼W
Q722	1	1	1	1	HT107331T0	Transistor 2SC733(T)
J591	1	1	1	1	YJ90000220	Jack, Remote (9P)
						PK27-PROGRAM SELECT CIRCUIT BOARD
PK27	1	1	1	1	YF42792770	P.W. Board, Program Select
	1	1	1	1	ZZ42792770	P.W. Board Assembly
						PK27-CAPACITORS
C701	1	1	1	1	DF15223300	Film 0.022μF ±5%
C702	1	1	1	1	EA10505030	Elect 1μF 50V
C703	1	1	1	1	EQ10505010	Elect 1μF 50V
						PK27-RESISTORS (All Resistors are ±5% & ¼W)
R716	1	1	1	1	GD05223140	22KΩ
R717	1	1	1	1	GD05473140	47KΩ
R718	1	1	1	1	GD05472140	4.7KΩ
R719	1	1	1	1	GD05104140	100KΩ
R720	1	1	1	1	GD05223140	22KΩ
R721	1	1	1	1	GD05473140	47KΩ
R722	1	1	1	1	GD05472140	4.7KΩ
R723	1	1	1	1	GD05104140	100KΩ
R724	1	1	1	1	GD05104140	100KΩ
R725	1	1	1	1	GD05104140	100KΩ
R726	1	1	1	1	GD05104140	100KΩ
R727	1	1	1	1	GD05103140	10KΩ
R728	1	1	1	1	GD05104140	100KΩ
						PK27-SEMICONDUCTORS
Q704	1	1	1	1	HC402300U0	IC, PD4023C or MC14023
Q705	1	1	1	1	HC452800B0	IC, PD4528C or MC14528B
Q706	1	1	1	1	HC401100U0	IC, PD4011C or MC14011
Q707	1	1	1	1	HC401100U0	IC, PD4011C or MC14011
Q711	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q712	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q713	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q714	1	1	1	1	HT320601R0	Transistor 2SC2060(R)
Q762	1	1	1	1	HD20011050	Diode 1S1555
Q763	1	1	1	1	HD20011050	Diode 1S1555
Q764	1	1	1	1	HD20011050	Diode 1S1555
Q765	1	1	1	1	HD20011050	Diode 1S1555
Q766	1	1	1	1	HD20011050	Diode 1S1555
Q767	1	1	1	1	HD20011050	Diode 1S1555
Q768	1	1	1	1	HD20011050	Diode 1S1555
Q769	1	1	1	1	HD20011050	Diode 1S1555
Q770	1	1	1	1	HD20011050	Diode 1S1555
Q771	1	1	1	1	HD20011050	Diode 1S1555
Q772	1	1	1	1	HD20011050	Diode 1S1555
Q773	1	1	1	1	HD20011050	Diode 1S1555
Q774	1	1	1	1	HD20011050	Diode 1S1555
Q775	1	1	1	1	HT326341S0	Transistor 2SC2634(S)

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						PK31-LOGIC CONTROL CIRCUIT BOARD
PK31	1	1	1	1	YH42791310	P.W. Board, Logic Control
	1	1	1	1	ZZ42791310	P.W. Board Assembly
						PK31-L.E.D.
Q591	1	1	1	1	HI10015020	L.E.D. LN317GP
Q592	1	1	1	1	HI10016020	L.E.D. LN417YP
Q593	1	1	1	1	HI10014020	L.E.D. LN217RP
						PK31-SWITCHES
S591	1	1	1	1	SK02010020	Keyboard Switch, REW
S592	1	1	1	1	SK02010020	Keyboard Switch, Stop
S593	1	1	1	1	SK02010020	Keyboard Switch, FF
S594	1	1	1	1	SK02010020	Keyboard Switch, Play
S595	1	1	1	1	SK02010020	Keyboard Switch, Pause
S596	1	1	1	1	SK02010020	Keyboard Switch, Rec
P591	1	1	1	1	YB00450080	Connective Cord (10P)
						PK32-SAFETY SWITCH CIRCUIT BOARD
PK32	1	1	1	1	YH42791320	P.W. Board, Safety Switch
	1	1	1	1	ZZ42791320	P.W. Board Assembly
S597	1	1	1	1	SP01010350	Push Switch, Safety
						PK33-SAFETY SWITCH CIRCUIT BOARD
PK33	1	1	1	1	YH42791330	P.W. Board, Safety Switch
	1	1	1	1	ZZ42791330	P.W. Board Assembly
S598	1	1	1	1	SP01010350	Push Switch, Safety
						PM01-MOTOR GOVERNOR CIRCUIT BOARD
PM01	1	1	1	1	YF43970020	P.W. Board, Motor Governor
	1	1	1	1	ZZ42971020	P.W. Board Assembly
						PM01-CAPACITORS
C011	1	1	1	1	EQ22601610	Elect 22μF 16V
CM01	1	1	1	1	DF15333300	Film 0.033μF ±5%
CM02	1	1	1	1	EA10602530	Elect 10μF 25V
CM03	1	1	1	1	DF15472300	Film 0.0047μF ±5%
CM04	1	1	1	1	EA10405030	Elect 0.1μF 50V
CM05	1	1	1	1	EA10405030	Elect 0.1μF 50V
CM06	1	1	1	1	EA10602530	Elect 10μF 25V
CM07	1	1	1	1	EA10602530	Elect 10μF 25V
CM08	1	1	1	1	EA10505030	Elect 1μF 50V
CM09	1	1	1	1	EA10405030	Elect 0.1μF 50V
CM10	1	1	1	1	EA10405030	Elect 0.1μF 50V
CM11	1	1	1	1	EA10602530	Elect 10μF 25V
CM12	1	1	1	1	EA10602530	Elect 10μF 25V
CM13	1	1	1	1	EA22701630	Elect 220μF 16V
CM14	1	1	1	1	EA47601630	Elect 47μF 16V
CM15	1	1	1	1	EA33601630	Elect 33μF 16V
CM16	1	1	1	1	EA47405030	Elect 0.47μF 50V
CM17	1	1	1	1	EA10602530	Elect 10μF 25V
CM18	1	1	1	1	EA47601630	Elect 47μF 16V
CM19	1	1	1	1	EA22601630	Elect 22μF 16V
CM20	1	1	1	1	EA47602530	Elect 47μF 25V
CM21	1	1	1	1	EA47602530	Elect 47μF 25V
CM22	1	1	1	1	EA10405030	Elect 0.1μF 50V
CM23	1	1	1	1	EA47602530	Elect 47μF 25V
						PM01-RESISTORS (All Resistors are ±5% & ¼W)
RM01	1	1	1	1	GG05331140	330Ω
RM02	1	1	1	1	GD05153140	15KΩ
RM03	1	1	1	1	GD05103140	10KΩ

- (U): for U.S.A.
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REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
RM04	1	1	1	1	GD05103140	10KΩ
RM05	1	1	1	1	GD05222140	2.2KΩ
RM06	1	1	1	1	GD05222140	2.2KΩ
RM07	1	1	1	1	GD05222140	2.2KΩ
RM08	1	1	1	1	GD05222140	2.2KΩ
RM09	1	1	1	1	GD05103140	10KΩ
RM10	1	1	1	1	GD05103140	10KΩ
RM11	1	1	1	1	RA01020300	1KΩTrim. Auto Tension
RM12	1	1	1	1	GG05181140	180Ω
RM13	1	1	1	1	GD05152140	1.5KΩ
RM14	1	1	1	1	GD05152140	1.5KΩ
RM15	1	1	1	1	GD05223140	22KΩ
RM16	1	1	1	1	GD05223140	22KΩ
RM17	1	1	1	1	GD05223140	22KΩ
RM18	1	1	1	1	GD05223140	22KΩ
RM19	1	1	1	1	GD05104140	100KΩ
RM20	1	1	1	1	GD05104140	100KΩ
RM21	1	1	1	1	GD05472140	4.7KΩ
RM22	1	1	1	1	GD05472140	4.7KΩ
RM23	1	1	1	1	GD05333140	33KΩ
RM24	1	1	1	1	GD05333140	33KΩ
RM25	1	1	1	1	GD05333140	33KΩ
RM26	1	1	1	1	GD05103140	10KΩ
RM27	1	1	1	1	GD05103140	10KΩ
RM32	1	1	1	1	GD05394140	390KΩ
RM34	1	1	1	1	RA05030160	50KΩTrim. CUE/REV
RM35	1	1	1	1	GG05471140	470Ω
RM36	1	1	1	1	GD05562140	5.6KΩ
RM37	1	1	1	1	GD05152140	1.5KΩ
RM38	1	1	1	1	GD05153140	15KΩ
RM39	1	1	1	1	GD05204140	200KΩ
RM40	1	1	1	1	GD05333140	33KΩ
RM41	1	1	1	1	GD05104140	100KΩ
RM43	1	1	1	1	GD05103140	10KΩ
RM44	1	1	1	1	GD05104140	100KΩ
RM45	1	1	1	1	GD05222140	2.2KΩ
RM46	1	1	1	1	GD05473140	47KΩ
RM47	1	1	1	1	GD05153140	15KΩ
RM48	1	1	1	1	RA05030160	50KΩTrim. Center Speed
RM49	1	1	1	1	GD05473140	47KΩ
RM50	1	1	1	1	GD05222140	2.2KΩ
						PM01-SEMICONDUTORS
QM01	1	1	1	1	HC10004250	IC CX-065A
QM02	1	1	1	1	HT106841R0	Transistor 2SA684(R)
QM03	1	1	1	1	HT106841R0	Transistor 2SA684(R)
QM04	1	1	1	1	HT313841R0	Transistor 2SC1384(R)
QM05	1	1	1	1	HT313841R0	Transistor 2SC1384(R)
QM06	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM07	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM08	1	1	1	1	HT403131E0	Transistor 2SD313(E)
QM09	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM10	1	1	1	1	HT403131E0	Transistor 2SD313(E)
QM11	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM12	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM13	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM14	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM15	1	1	1	1	HD20011050	Diode 1S1555
QM16	1	1	1	1	HD20011050	Diode 1S1555
QM18	1	1	1	1	HD20011050	Diode 1S1555
QM19	1	1	1	1	HT309451R0	Transistor 2SC945(R)
QM20	1	1	1	1	HF200301C0	F.E.T. 2SK30A(Y)
QM21	1	1	1	1	HC452800B0	IC µPD4528C or MC14528B
QM22	1	1	1	1	HD10001010	Diode 1N34A
QM23	1	1	1	1	HD10001010	Diode 1N34A

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						P400-POWER SUPPLY & BIAS OSC CIRCUIT BOARD
P400	1	1	1	1	YF42790040	P.W. Board, Power Supply & Bias OSC
	1	1			ZZ42791040	P.W. Board Assembly
			1	1	ZZ42798040	P.W. Board Assembly
						P400-CAPACITORS
C401	1	1	1	1	DK18102300	Ceramic 0.001µF
C402	1	1	1	1	DK18102300	Ceramic 0.001µF
C403	1	1	1	1	DK18102300	Ceramic 0.001µF
C404	1	1	1	1	DK18102300	Ceramic 0.001µF
⚠C405	1	1	1	1	EA10803530	Elect 1000µF 35V
⚠C406	1	1	1	1	EA10803530	Elect 1000µF 35V
⚠C407	1	1	1	1	EA47702530	Elect 470µF 25V
⚠C408	1	1	1	1	EA47702530	Elect 470µF 25V
C409	1	1	1	1	DK18102300	Ceramic 0.001µF
C410	1	1	1	1	DK18102300	Ceramic 0.001µF
C411	1	1	1	1	DK18102300	Ceramic 0.001µF
C412	1	1	1	1	DK18102300	Ceramic 0.001µF
⚠C413	1	1	1	1	EA22803530	Elect 2200µF 35V
⚠C414	1	1	1	1	EA22803530	Elect 2200µF 35V
C415	1	1	1	1	DF75103510	Film 0.01µF ±5%
C416	1	1	1	1	DF75103510	Film 0.01µF ±5%
C417	1	1	1	1	DF75332510	Film 0.0033µF ±5%
C418	1	1	1	1	DF75332510	Film 0.0033µF ±5%
C419	1	1	1	1	DF75103510	Film 0.01µF ±5%
⚠C420	1	1	1	1	EA22505030	Elect 2.2µF 50V
C421	1	1	1	1	DF75102510	Film 0.001µF ±5%
C422	1	1	1	1	DF55391510	Film 390pF ±5%
C423	1	1	1	1	DF55391510	Film 390pF ±5%
C424	1	1	1	1	EA22802530	Elect 2200µF 25V
C425	1	1	1	1	DK18473320	Ceramic 0.047µF
⚠C426	1	1	1	1	EA47701630	Elect 470µF 16V
C429	1	1	1	1	DF75153510	Film 0.015µF ±5%
C430	1	1	1	1	DF75473510	Film 0.047µF ±5%
C431	1	1	1	1	DF75153510	Film 0.015µF ±5%
⚠C432	1	1	1	1	EA10701630	Elect 100µF 16V
C433	1	1	1	1	DF75183510	Film 0.018µF ±5%
C434	1	1	1	1	EA47706330	Elect 470µF 63V
⚠C435	1	1	1	1	EA10801630	Elect 1000µF 16V
C436	1	1	1	1	DK18473320	Ceramic 0.047µF
C439	1	1	1	1	EA22703530	Elect 220µF 35V
C440	1	1	1	1	EA22701630	Elect 220µF 16V
⚠C445	1	1	1	1	EA10801630	Elect 1000µF 16V
C448	1	1	1	1	EA10505030	Elect 1µF 50V
						P400-RESISTORS (All Resistors are ±5% & ¼W)
⚠R401	1	1	1	1	GG05056010	5.6Ω 1W
⚠R402	1	1	1	1	GA05471010	470Ω 1W
⚠R403	1	1	1	1	GA05391010	390Ω 1W
R404	1	1	1	1	GD05223140	22KΩ
R405	1	1	1	1	GD05223140	22KΩ
R406	1	1	1	1	GD05100140	10Ω
R407	1	1	1	1	GD05100140	10Ω
R408	1	1	1	1	GJ05103010	10KΩ 1W
R409	1	1	1	1	GJ05103010	10KΩ 1W
R410	1	1	1	1	RA04730090	47KΩTrim. Bias Current

- (U): for U.S.A.
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REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
R411	1	1	1	1	RA04730090	47KΩ Trim. Bias Current
R415	1	1	1	1	GD05223140	22KΩ
R416	1	1	1	1	GA05082010	8.2Ω 1W
R417	1	1	1	1	GG05220140	22Ω
⚠R418	1	1	1	1	GG05102120	1KΩ ½W
⚠R419	1	1	1	1	GA05056020	5.6Ω 2W
⚠R420	1	1	1	1	GA05821010	820Ω 1W
R421	1	1	1	1	GD05272140	2.7KΩ
R422	1	1	1	1	GD05432140	4.3KΩ
R423	1	1	1	1	GD05682140	6.8KΩ
R424	1	1	1	1	GD05473140	47KΩ
R425	1	1	1	1	GD05332140	3.3KΩ
R426	1	1	1	1	GD05393140	39KΩ
⚠R428	1	1	1	1	GA05102010	1KΩ 1W
⚠R429	1	1	1	1	GA05102010	1KΩ 1W
R430	1	1	1	1	75061001P0	Jumper
R435	1	1	1	1	GA05222010	2.2KΩ 1W
⚠R440	1	1	1	1	GG05220140	22Ω
						P400-SEMICONDUCTORS
⚠Q401	1	1	1	1	HD20020080	Diode MI-151R
⚠Q402	1	1	1	1	HD20019080	Diode MI-151
⚠Q403	1	1	1	1	HT403131F0	Transistor 2SD313(F)
⚠Q404	1	1	1	1	HD30048090	Zener WZ-210
⚠Q405	1	1	1	1	HD20008290	Diode S4VB
Q409	1	1	1	1	HT313841R0	Transistor 2SC1384(R)
Q410	1	1	1	1	HT313841R0	Transistor 2SC1384(R)
⚠Q411	1	1	1	1	HD20020080	Diode MI-151R
⚠Q412	1	1	1	1	HD20019080	Diode MI-151
⚠Q413	1	1	1	1	HD20020080	Diode MI-151R
⚠Q414	1	1	1	1	HD20019080	Diode MI-151
Q417	1	1	1	1	HT313841R0	Transistor 2SC1384(R)
⚠Q419	1	1	1	1	HD20020080	Diode MI-151R
⚠Q420	1	1	1	1	HD20019080	Diode MI-151
⚠Q421	1	1			HT403131F0	Transistor 2SD313(F)
⚠Q421			1	1	HT407181B0	Transistor 2SD718(Q)
Q422	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
⚠Q423	1	1	1	1	HD30015060	Zener RD5.6EB2
Q424	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
⚠Q425	1	1	1	1	HD20022100	Diode 10E1-FA
Q426	1	1	1	1	HD30029090	Zener WZ-090
Q427	1	1	1	1	HT326341S0	Transistor 2SC2634(S)
Q428	1	1	1	1	HD20011050	Diode 1S1555
Q429	1	1	1	1	HD20011050	Diode 1S1555
Q430	1	1	1	1	75061001P0	Jumper
⚠Q432	1	1	1	1	HT403131E0	Transistor 2SD313(E)
						P400-MISCELLANEOUS
L401	1	1	1	1	LC12750020	Choke Coil 2.7µH
L402	1	1	1	1	LC12750020	Choke Coil 2.7µH
T401	1	1	1	1	TC10140110	OSC Transf. Bias 105KHz
T402	1	1	1	1	TC10140120	OSC Transf. Erase 65KHz
P404	1	1	1	1	YJ06001430	Jack, (9P)
P509	1	1	1	1	YP06001050	Plug, (5P)

REF. DESIG.	Q'TY				PART NO.	DESCRIPTION
	U	C	N	A		
						P800-TIMER RELAY CIRCUIT BOARD
P800	1	1	1	1	YF42790050	P.W. Board, Timer Relay
	1	1	1	1	ZZ42790050	P.W. Board Assembly
						P800-CAPACITORS
G802			1	1	DF17223800	Film 0.022µF ±20%
						P800-RESISTORS
R801	1	1	1	1	GD05103140	10KΩ ±5% ¼W
R802	1	1	1	1	GD05102140	1KΩ ±5% ¼W
						P800-SEMICONDUCTORS
Q801	1	1	1	1	HD20022100	Diode 10E-1
Q802	1	1	1	1	HT106841R0	Transistor 2SA684(R)
						P800-MISCELLANEOUS
J803 ~ J810	8	8	8	8	YP10001530	Plug
J851	3	3	3	3	YP10001130	Plug, Wire Wrap
L802	1	1			LY10120140	Relay, G2W-1112V UL, CSA
L802			1	1	LY10120150	Relay, G2W-1112V Semko
Z801	1				BF10400030	Cap. Comp. Spark Killer
G801		1			BF33300020	Cap. Comp. Spark Killer
						P900-FUSE CIRCUIT BOARD
P900			1	1	WF42790020	P.W. Board, Fuse
			1	1	ZZ42798020	P.W. Board Assembly
						P900-FUSE
⚠ F901			1	1	FS10100800	Fuse, 1A Semko
⚠ F902			1	1	FS10200800	Fuse, 2A Semko
⚠ F903			1	1	FS10080800	Fuse, 0.8A Semko
⚠ F904			1	1	FS10140800	Fuse, 1.4A Semko
⚠ F905			1	1	FS10080800	Fuse, 0.8A Semko
						P900-JACK
J911 ~ J920			10	10	YJ08000200	Fuse Clip
						P001-PHOTO COUPLER CIRCUIT BOARD
P001	2	2	2	2	YF43970010	P.W. Board, Photo Coupler
	2	2	2	2	ZZ43970010	P.W. Board Assembly
Q001	2	2	2	2	HW10001030	Photo Unit

(W01-99)	**Assembly and Wiring**
(T01-99)	**Adjustment**
(X01-00)	**Correction**

12. TECHNICAL SPECIFICATIONS

Type	Front loading 4-Track, 2-Channel Stereo Record/Playback System	
Tape	Phillips-type Compact Cassette	
Tape Speeds	High: 3-3/4 ips (9.52 cm/sec)	Standard: 1-7/8 ips (4.76 cm/sec)
Motor Drive System	DC Servo Motor (x2) with Single Capstan Drive	
Heads	2 Head System Erase Head: Ferrite Record/Play Head: Sendust Alloy	
Level Indicators	Left and Right LED Peak Level Displays	
Noise Reduction System	Dolby NR	
Semiconductors		
Transistors	91	
IC's	7	
Diodes	71	
LED's	18	
Wow and Fluter (WRMS)	High Speed 0.03%	Standard Speed 0.05%
Frequency Response (Overall, −20 dB below 0 VU)		
Metal	25 Hz ~ 23 kHz (±3 dB)	25 Hz ~ 20 kHz (±3 dB)
Ferrichrome (FeCr)	25 Hz ~ 22 kHz (±3 dB)	25 Hz ~ 18 kHz (±3 dB)
Chromium Dioxide (CrO_2)	25 Hz ~ 22 kHz (±3 dB)	25 Hz ~ 17 kHz (±3 dB)
Ferric (Normal)	25 Hz ~ 20 kHz (±3 dB)	25 Hz ~ 16 kHz (±3 dB)
Signal-to-Noise Ratio		
Dolby ON	72 dB (over 5 kHz)	69 dB (over 5 kHz)
Dolby OFF	62 dB	59 dB
Outputs		
Line: Level	650 mV	
Impedance	1.2 kΩ	
Headphone: Level	43 mV	
Impedance	150 Ω	
Inputs (Level at 0 VU)		
Line: Sensitivity	−23 dBV (70 mV)	
Impedance	82 kΩ	
Mic: Sensitivity	−72 dBV (0.25 mV)	
Impedance	Low Z	
Fast Rewind Time	Approx. 85 sec. (C-60 cassette)	
Fast Forward Time	Approx. 85 sec. (C-60 cassette)	
Bias Frequency	100 kHz	
Power Requirements	120 V AC, 60 Hz	
Power Consumption	30 Watts	
Dimensions (W x H x D)	16-3/8 in. x 5-3/4 in. x 11-5/8 in. (41.6 cm) x (14.6 cm) x (29.5 cm)	
Net Weight	22 lbs. 1 oz. (10 kg)	

NOTES:

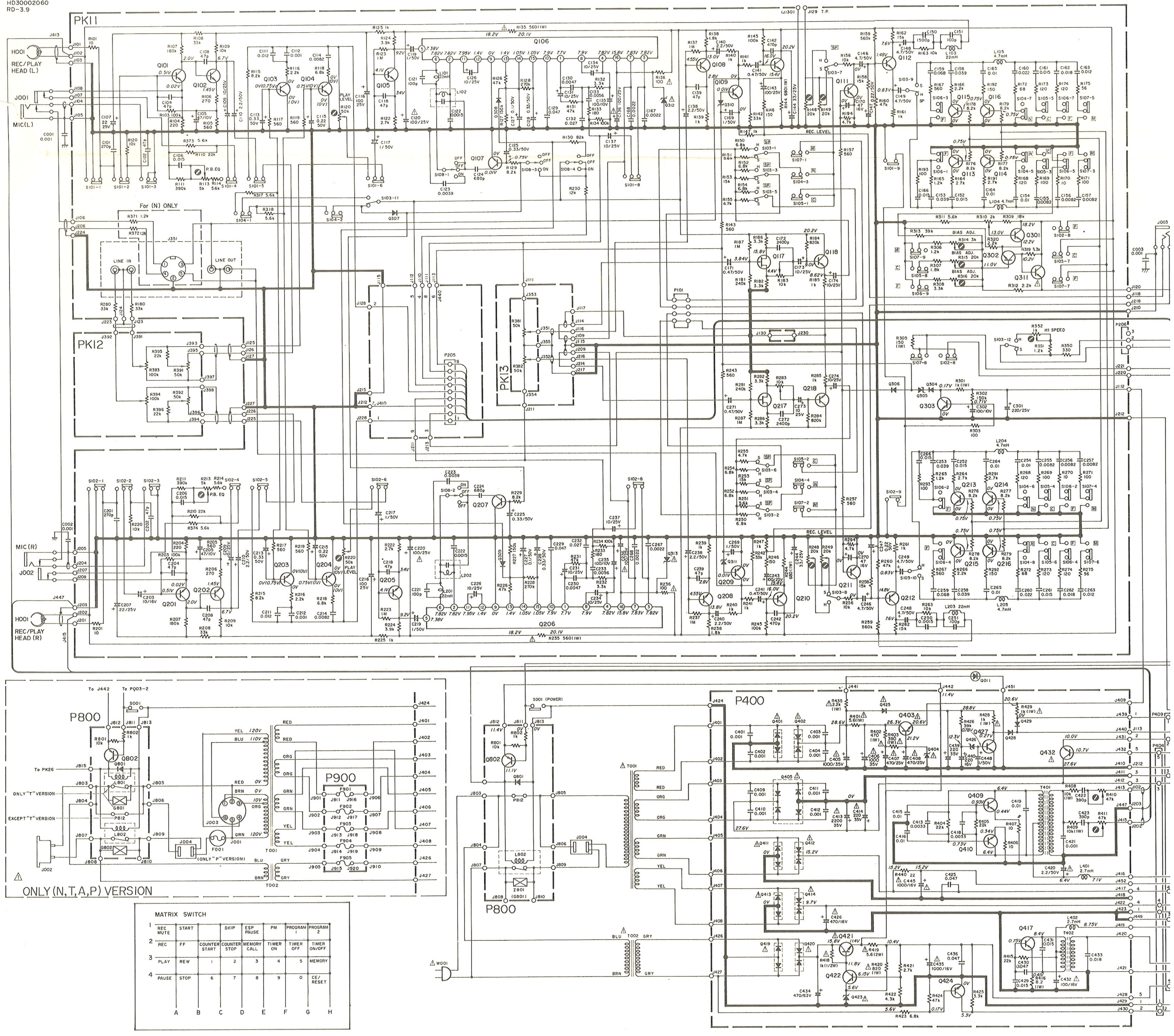
1. Reference recording level: 0 VU (160 nW/M)
2. Reference frequency: 315 Hz
3. Wow and flutter measured at: 3.0 kHz NAB WGTD RMS
4. Frequency response measured at: 20 dB below 0 VU recording level reference (Dolby off)
5. S/N ratio measured at the recorded level equivalent to 3% THD, IEC "A" WGTD, 70 µSec. EQ.
6. Recording reference tapes:
   Normal: TDK AC 211
   CrO_2 : TDK AC 511
   FeCr: Sony CS 30
   Metal: TDK AC-701

13. SCHEMATIC DIAGRAM

SEMICONDUCTORS

Q105,Q205	Q001	Q002 ~ Q004	Q011	Q101,Q102,Q110,Q118,Q201 Q202,Q210,Q218,Q303	Q103,Q104, Q203	Q107 ~ Q109,Q111 ~ Q116 Q207 ~ Q209,Q211 ~ Q216,Q213,Q214	Q106,Q206	Q117,Q217	Q301,Q302	Q304,Q306 ~ Q309	Q305	Q312,Q313	Q320	Q401,Q411,Q413 Q414,Q419
HT31400IE0	HW10001030	HD20023100	HI10009300	HT32634IT0	HT32634IS0		HC10001360	HF20030IC0	HT30945IP0	HD20011050	HD30033090	HD30030090	HT40313IE0	HD20020080
2SC1400(E)		10E1LF	AR2132D	2SC2634(T)	2SC2634(S)		LM1011AN	2SK30A(Y)	2SC945(P)	1S1555	WZ052	WZ177	2SD313(E)	MI-151R

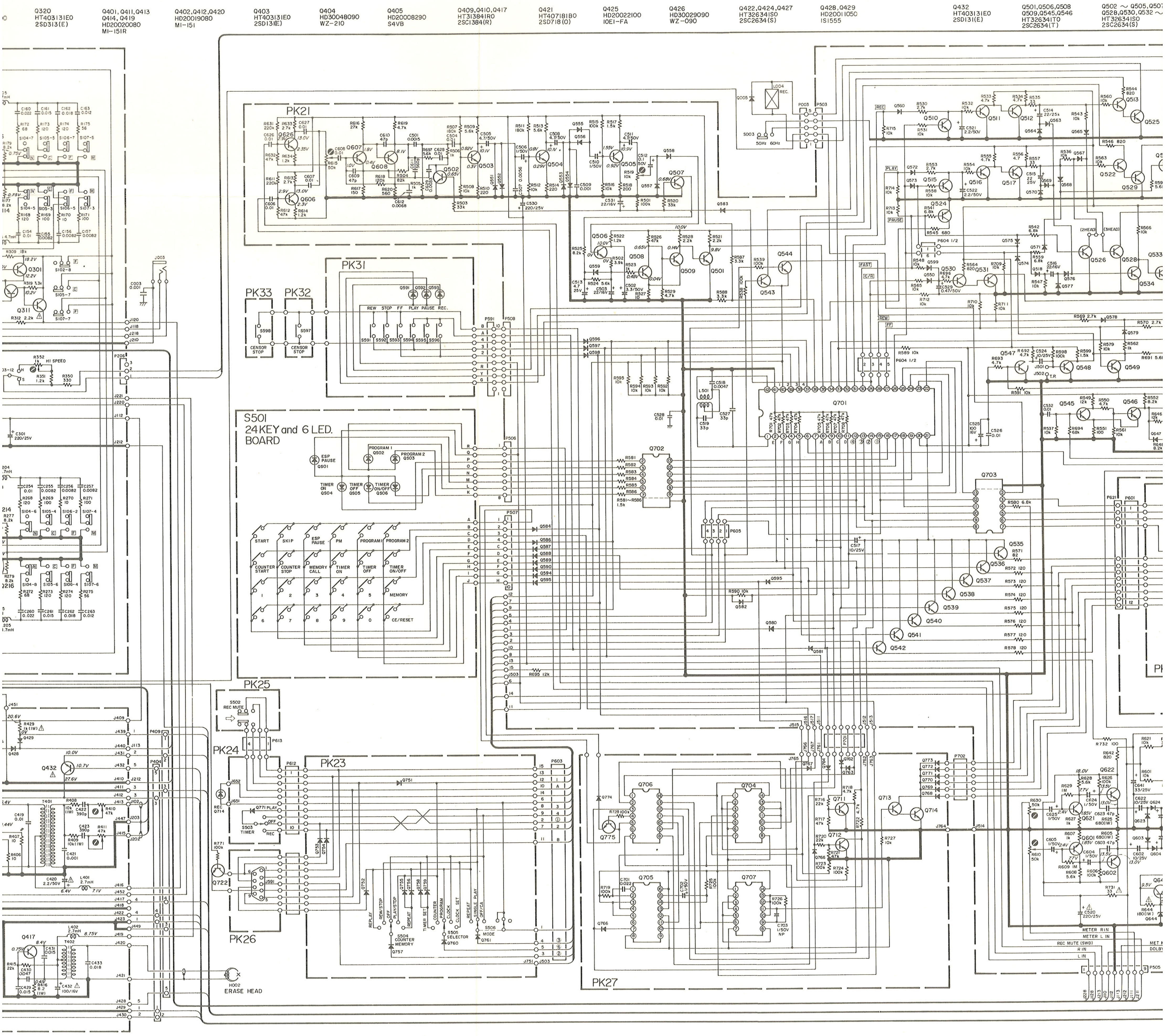
Q310,Q311
HD30002060
RD-3.9


PK11
PK12
PK13
P400
P800
P900
H001 REC/PLAY HEAD (L)
H001 REC/PLAY HEAD (R)
J001 MIC(L)
J002 MIC(R)
LINE IN
LINE OUT
For (N) ONLY
Q106
Q206
REC. LEVEL
PLAY LEVEL
BIAS ADJ.
HI SPEED
S001 (POWER)
T001
T002
F001
(ONLY "P" VERSION)
ONLY "T" VERSION
EXCEPT "T" VERSION
ONLY (N,T,A,P) VERSION

MATRIX SWITCH

	A	B	C	D	E	F	G	H
1	REC MUTE	START		SKIP	ESP PAUSE	PM	PROGRAM 1	PROGRAM 2
2	REC	FF	COUNTER START	COUNTER STOP	MEMORY CALL	TIMER ON	TIMER OFF	TIMER ON/OFF
3	PLAY	REW	1	2	3	4	5	MEMORY
4	PAUSE	STOP	6	7	8	9	0	CE/ RESET

Note on safety: The parts marked with ⚠ are important parts on the safety. Please use the parts having the designated parts number without fail.

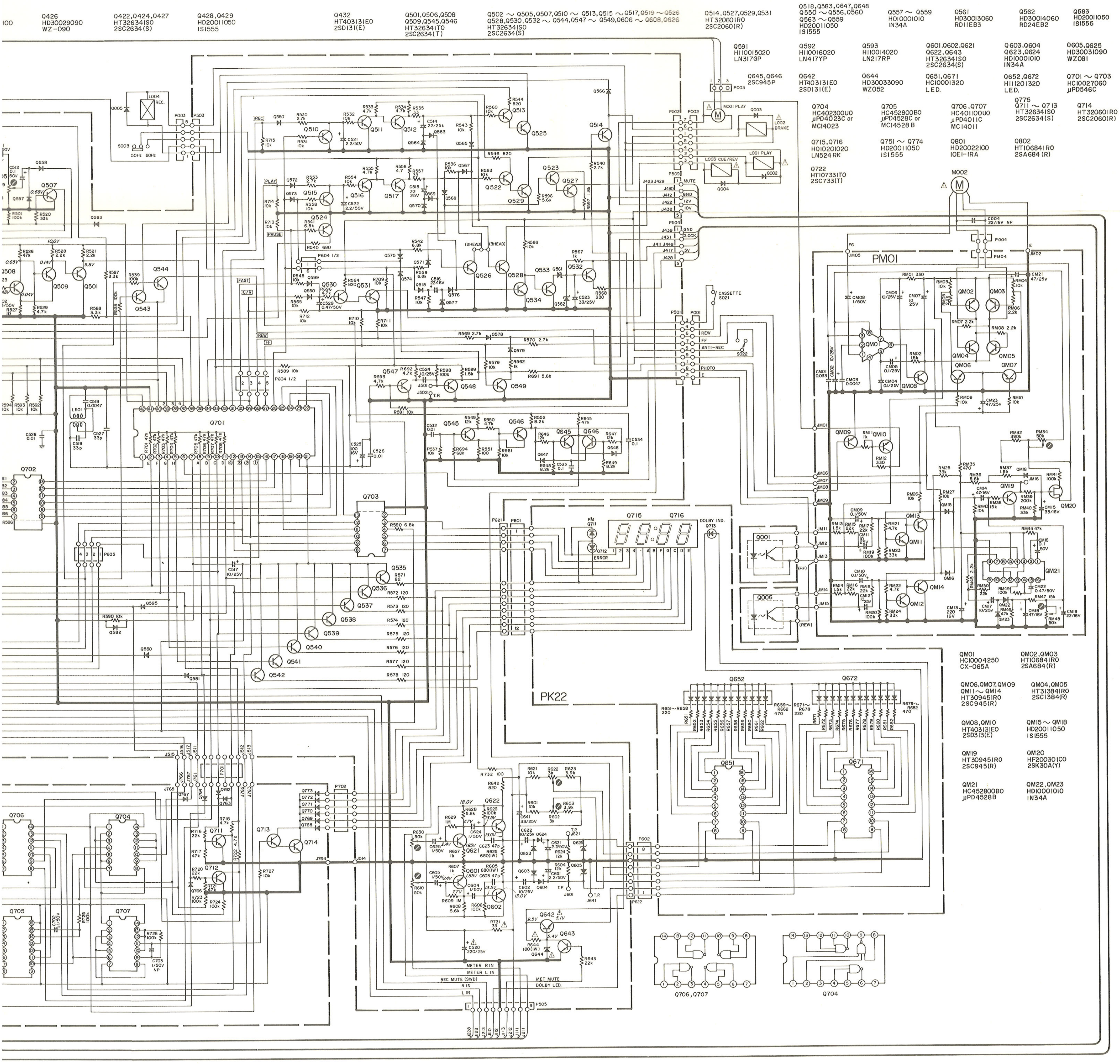

Q320 HT403131E0 2SD313(E)
Q401, Q411, Q413 Q414, Q419 HD20020080 MI-151R
Q402, Q412, Q420 HD20019080 MI-151
Q403 HT403131E0 2SD131(E)
Q404 HD30048090 WZ-210
Q405 HD20008290 S4VB
Q409, Q410, Q417 HT313841R0 2SC1384(R)
Q421 HT407181B0 2SD718(O)
Q425 HD20022100 10E1-FA
Q426 HD30029090 WZ-090
Q422, Q424, Q427 HT326341S0 2SC2634(S)
Q428, Q429 HD20011050 1S1555
Q432 HT403131E0 2SD131(E)
Q501, Q506, Q508 Q509, Q545, Q546 HT326341T0 2SC2634(T)
Q502 ~ Q505, Q507 Q528, Q530, Q532 ~ HT326341S0 2SC2634(S)
PK21
PK31
PK33
PK32
CENSOR STOP
REW
STOP
FF
PLAY
PAUSE
REC.
S501 24 KEY and 6 LED. BOARD
ESP PAUSE
PROGRAM 1
PROGRAM 2
TIMER ON
TIMER OFF
TIMER ON/OFF
START
SKIP
ESP PAUSE
PM
COUNTER START
COUNTER STOP
MEMORY CALL
TIMER ON
TIMER OFF
TIMER ON/OFF
MEMORY
CE/RESET
Q701
Q702
Q703
PK25
REC MUTE
PK24
PK23
PK26
PK27
REC
PLAY
TIMER
Q704
Q705
Q706
Q707
ERASE HEAD
HI SPEED
REC
PLAY
PAUSE
FAST
50Hz 60Hz
METER R IN
METER L IN
REC MUTE (SWD)
R IN
L IN

SWITCHES

S101: REC/PLAY SWITCH	(REC)	S104: TAPE SELECTOR	(NORMAL)
S102: REC/PLAY SWITCH	(REC)	S105: TAPE SELECTOR	(Special/CrO 2)
S103: TAPE SPEED SWITCH	(STANDARD)	S106: TAPE SELECTOR	(FeCr)
		S107: TAPE SELECTOR	(Metal)

Components and wiring are subject to change for modification without notice.

Model SD8000



Q426 HD30029090 WZ-090
Q422,Q424,Q427 HT32634ISO 2SC2634(S)
Q428,Q429 HD20011050 IS1555
Q432 HT40313IE0 2SD131(E)
Q501,Q506,Q508 Q509,Q545,Q546 HT32634IT0 2SC2634(T)
Q514,Q527,Q529,Q531 HT32060IR0 2SC2060(R)
Q557 ~ Q559 HD10001010 IN34A
Q561 HD30013060 RD11EB3
Q562 HD30014060 RD24EB2
Q583 HD20011050 IS1555
Q591 H110015020 LN317GP
Q592 H110016020 LN417YP
Q593 H110014020 LN217RP
Q645,Q646 2SC945P
Q642 HT40313IE0 2SD131(E)
Q644 HD30033090 WZ052
Q704 HC402300U0 μPD4023C or MC14023
Q705 HC452800B0 μPD4528C or MC14528B
Q706,Q707 HC401100U0 μPD4011C or MC14011
Q714 HT32060IR0 2SC2060(R)
Q722 HT10733IT0 2SC733(T)
Q801 HD20022100 10E1-IRA
Q802 HT10684IR0 2SA684(R)
M001 PLAY
M002
L001 PLAY
L002 BRAKE
L003 CUE/REV
L004 REC.
CASSETTE S021
PM01
Q701
Q702
Q703
Q715
Q716
DOLBY IND.
ERROR
PK22
Q652
Q672
Q651
Q671
Q706,Q707
Q704
QM01 HC10004250 CX-065A
QM02,QM03 HT10684IR0 2SA684(R)
QM06,QM07,QM09 QM11 ~ QM14 HT30945IR0 2SC945(R)
QM04,QM05 HT31384IR0 2SC1384(R)
QM08,QM10 HT40313IE0 2SD313(E)
QM15 ~ QM18 HD20011050 IS1555
QM19 HT30945IR0 2SC945(R)
QM20 HF20030IC0 2SK30A(Y)
QM21 HC452800B0 μPD4528B
QM22,QM23 HD10001010 IN34A
REC MUTE (SWD)
METER R IN
METER L IN
MET MUTE
DOLBY LED.
R IN
L IN
P505

APE SELECTOR	(NORMAL)
APE SELECTOR	(Special/CrO 2)
APE SELECTOR	(FeCr)
APE SELECTOR	(Metal)

nge for modification without notice.

MODEL SD 8000 TECHNICAL SPECIFICATIONS (DIN)

Style	Direct Load
Tape Drive System	Single Capstan Drive
Cartridge	Philips type compact cassette
Track System	Compatible Stereo 4-track 2-channel
Tape Speed	4.75 cm/sec. & 9.5 cm/sec.
Heads	2 Head System
Composition	Rec/Play: Sendust Alloy Erase:Ferrite
Motor	DC Servo Controlled Motor x 2
Meters	LED Peak x 2
Recording System	AC Bias
Erasing System	AC Erase
Semiconductor Complement	
Transistors	91
Diodes	71
IC's	7
LED's	8

Overall Frequency Response (Dolby off):	**Tape Speed:**	**Tape Speed:**
Ferric Oxide Tape	**at 20 dB for 4.75 cm/sec.**	**at 10 dB for 9.5 cm/sec.**
CrO_2 Tape	25 Hz ~ 16 kHz (±3 dB)	25 Hz ~ 18.5 kHz (±3 dB)
Fe-Cr Tape	25 Hz ~ 17.5 kHz (±3 dB)	25 Hz ~ 19 kHz (±3 dB)
Metal Tape	25 Hz ~ 18 kHz (±3 dB)	25 Hz ~ 19.5 kHz (±3 dB)
	25 Hz ~ 18.5 kHz (±3 dB)	25 Hz ~ 20.5 kHz (±3 dB)

Total Harmonic Distortion	
Ferric Oxide Tape	2%
CrO_2 Tape	2.5%
Fe-Cr Tape	2.5%
Metal	2.5%

	Tape Speed: 4.75 cm/sec.	**Tape Speed: 9.5 cm/sec.**
Wow and Flutter (DIN WTD)	0.10%	0.07%

Fast Rewind Time	60 sec.
Fast Forward Time	60 sec.
AC Line Voltage	220 V AC, 50 Hz

(E/N versions are featuring an external voltage selector for use on 110/220 V. T/A versions 220/240 V AC, 50/60 Hz.)

Power Consumption	63 W
Dimensions (W x H x D)	416 mm x 146 mm x 243 mm
Weight	9.1 kg